

# First Level / Bologna System

| Level | Semester | No. | Module Code | Module Name in English                      | اسم المادة الدراسية            | Language | SSWL (hr/w)        |   |   |   | CL (hr/w) | Lect (hr/w) | Lab (hr/w) | Pr (hr/w) | Tut (hr/w) | Semnn (hr/w) | Exam hr/sem | SSWL hr/sem | USSWL hr/sem | SWL hr/sem | ECTS | Module Type | Prerequisite Module(s) Code |  |  |  |
|-------|----------|-----|-------------|---------------------------------------------|--------------------------------|----------|--------------------|---|---|---|-----------|-------------|------------|-----------|------------|--------------|-------------|-------------|--------------|------------|------|-------------|-----------------------------|--|--|--|
| 1     |          | 1   | DWRE 111    | Mathematics I                               | الرياضيات I                    | English  | 3                  | 1 |   |   |           |             |            |           | 2          |              | 3           | 93          | 82           | 175        | 7.00 | B           |                             |  |  |  |
|       |          | 2   | DWRE 112    | Engineering Mechanics I                     | الميكانيك الهندسي I            | English  | 2                  | 1 |   |   |           |             |            |           | 2          |              | 3           | 78          | 72           | 150        | 6.00 | B           |                             |  |  |  |
|       |          | 3   | DWRE 113    | Engineering Drawing                         | الرسم الهندسي                  | English  |                    |   |   |   |           |             | 6          |           |            |              | 3           | 93          | 57           | 150        | 6.00 | B           |                             |  |  |  |
|       |          | 4   | UOM 1011    | Arabic 1                                    | اللغة العربية 1                | Arabic   | 2                  |   |   |   |           |             |            |           |            |              | 3           | 33          | 17           | 50         | 2.00 | S           |                             |  |  |  |
|       |          | 5   | DWRE 114    | Introduction to Water Resources Engineering | مقدمة في هندسة الموارد المائية | Arabic   | 2                  | 1 |   |   |           |             |            |           |            |              | 3           | 48          | 27           | 75         | 3.00 | C           |                             |  |  |  |
|       |          | 6   | UOM 1031    | Computer 1                                  | حاسوب 1                        | English  | 1                  |   |   |   |           |             | 2          |           |            |              | 3           | 48          | 27           | 75         | 3.00 | S           |                             |  |  |  |
|       |          | 7   | DWRE 117    | Geology                                     | جيولوجي                        | Arabic   | 2                  | 1 |   |   |           |             |            |           |            |              | 3           | 48          | 27           | 75         | 3.00 | S           |                             |  |  |  |
|       |          |     |             |                                             |                                |          | 12                 | 4 | 8 | 0 | 4         | 0           | 0          | 0         | 0          | 21           | 441         | 309         | 750          | 30.00      |      |             |                             |  |  |  |
|       |          |     |             |                                             |                                |          | Total Weekly Hours |   |   |   | 28        |             |            |           |            |              |             |             |              |            |      |             |                             |  |  |  |
| UGI   | Semester | No. | Module Code | Module Name in English                      | اسم المادة الدراسية            | Language | SSWL (hr/w)        |   |   |   | CL (hr/w) | Lect (hr/w) | Lab (hr/w) | Pr (hr/w) | Tut (hr/w) | Semnn (hr/w) | Exam hr/sem | SSWL hr/sem | USSWL hr/sem | SWL hr/sem | ECTS | Module Type | Prerequisite Module(s) Code |  |  |  |
|       |          | 1   | DWRE 121    | Mathematics II                              | الرياضيات II                   | English  | 3                  | 1 |   |   |           |             |            |           | 2          |              | 3           | 93          | 82           | 175        | 7.00 | B           |                             |  |  |  |
|       |          | 2   | DWRE 122    | Engineering Mechanics II                    | الميكانيك الهندسي II           | English  | 2                  | 1 |   |   |           |             |            |           | 2          |              | 3           | 78          | 72           | 150        | 6.00 | B           |                             |  |  |  |
|       |          | 3   | DWRE 123    | Computer Drawing                            | الرسم بواسطة الحاسوب           | English  |                    |   |   |   |           |             | 6          |           |            |              | 3           | 93          | 57           | 150        | 6.00 | B           |                             |  |  |  |
|       |          | 4   | DWRE 124    | Statistics                                  | الإحصاء                        | English  | 1                  |   |   |   |           |             |            | 2         |            |              | 3           | 48          | 52           | 100        | 4.00 | B           |                             |  |  |  |
|       |          | 5   | DWRE 125    | Chemistry                                   | كيمياء                         | Arabic   | 1                  |   |   |   |           |             | 2          |           |            |              | 3           | 48          | 27           | 75         | 3.00 | S           |                             |  |  |  |
|       |          | 6   | UOM 1040    | Human Rights and Democracy                  | الديمقراطية وحقوق الإنسان      | Arabic   | 2                  |   |   |   |           |             |            |           |            |              | 3           | 33          | 17           | 50         | 2.00 | B           |                             |  |  |  |
|       |          | 7   | UOM 1021    | English 1                                   | اللغة الانجليزية 1             | English  | 2                  |   |   |   |           |             |            |           |            |              | 3           | 33          | 17           | 50         | 2.00 | S           |                             |  |  |  |
|       |          |     |             |                                             |                                |          | 11                 | 2 | 8 | 0 | 6         | 0           | 0          | 0         | 0          | 21           | 426         | 324         | 750          | 30.00      |      |             |                             |  |  |  |

## Course Description Form

|                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                            |                                |                            |                          |
|----------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------|--------------------------------|----------------------------|--------------------------|
| <b>1. Course Name:</b>                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                            |                                |                            |                          |
| Mathematics I                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                            |                                |                            |                          |
| <b>2. Course Code:</b>                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                            |                                |                            |                          |
| DWRE 111                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                            |                                |                            |                          |
| <b>3. Semester / Year:</b>                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                            |                                |                            |                          |
| First/ 2025–2026                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                            |                                |                            |                          |
| <b>4. Description Preparation Date:</b>                                    |                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                            |                                |                            |                          |
| 1/6/2025                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                            |                                |                            |                          |
| <b>5. Available Attendance Forms:</b>                                      |                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                            |                                |                            |                          |
| Lectures in the classroom                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                            |                                |                            |                          |
| <b>6. Number of Credit Hours (Total) / Number of Units (Total)</b>         |                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                            |                                |                            |                          |
| 93 hours/ 7 ECTS credits                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                            |                                |                            |                          |
| <b>7. Course administrator's name (mention all, if more than one name)</b> |                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                            |                                |                            |                          |
| Name: Dr. Ahmed Ali Mohammed Ameen, Email: a.alogaidi@uomosul.edu.iq       |                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                            |                                |                            |                          |
| <b>8. Course Objectives</b>                                                |                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                            |                                |                            |                          |
| <b>Course Objectives</b>                                                   | Knowledge of the Matrices and determinants, An Overview of the derivatives, Integration, Indefinite integral, Integration by substitution, The definite integral, Evaluating definite integrals by substitution, Applications of the definite integral, Area between two curves, Volumes by slicing; disks and washers, Volumes by cylindrical shells, Length of a plane curve and Area of a surface of revolution. |                                                                            |                                |                            |                          |
| <b>9. Teaching and Learning Strategies</b>                                 |                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                            |                                |                            |                          |
| <b>Strategy</b>                                                            | The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering some challenging problems to motivate students.                                                                            |                                                                            |                                |                            |                          |
| <b>10. Course Structure</b>                                                |                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                            |                                |                            |                          |
| <b>Week</b>                                                                | <b>Hours</b>                                                                                                                                                                                                                                                                                                                                                                                                        | <b>Required Learning Outcomes</b>                                          | <b>Unit or subject name</b>    | <b>Learning method</b>     | <b>Evaluation method</b> |
| 1                                                                          | 6                                                                                                                                                                                                                                                                                                                                                                                                                   | The student learned how to solve matrices and determinants in several ways | Matrices and determinants      | A lecture in the classroom | HW and CW                |
| 2                                                                          | 6                                                                                                                                                                                                                                                                                                                                                                                                                   | The student learned how to derive equations and find the slope             | An Overview of the derivatives | A lecture in the classroom | HW, CW, exam             |
| 3                                                                          | 6                                                                                                                                                                                                                                                                                                                                                                                                                   | The student learns how to solve integrals                                  | Integration                    | A lecture in the classroom | HW, CW, exam             |
| 4                                                                          | 6                                                                                                                                                                                                                                                                                                                                                                                                                   | The student learned to solve indefinite integrals                          | Indefinite integral            | A lecture in the classroom | HW, CW, exam             |
| 5                                                                          | 6                                                                                                                                                                                                                                                                                                                                                                                                                   | The student learned to solve another type of integrals                     | Integration by substitution,   | A lecture in the classroom | HW, CW, exam             |

|       |    |                                                                                      |                                               |                            |              |
|-------|----|--------------------------------------------------------------------------------------|-----------------------------------------------|----------------------------|--------------|
| 6     | 6  | The student learned how to solve an important type of definite integral              | The definite integral                         | A lecture in the classroom | HW, CW, exam |
| 7     | 6  | The student learned how to solve a type of definite integral using substitution      | Evaluating definite integrals by substitution | A lecture in the classroom | HW, CW, exam |
| 8-9   | 12 | The student learns how to apply definite integrals                                   | Applications of the definite integral         | A lecture in the classroom | HW, CW, exam |
| 10    | 6  | The student learned how to find the areas of specific shapes by applying integrals   | Area between two curves                       | A lecture in the classroom | HW, CW, exam |
| 11-12 | 12 | The student learned how to find the volumes of specific shapes by applying integrals | Volumes by slicing; disks wash                | A lecture in the classroom | HW, CW, exam |
| 13    | 6  | The student learned how to find the volumes of specific shapes by applying integrals | Volumes by cylindrical shells                 | A lecture in the classroom | HW, CW, exam |
| 14    | 6  | The student learned how to find the specified lengths by applying integrals          | Length of a plane curve                       | A lecture in the classroom | HW, CW, exam |
| 15    | 6  | The student learned how to find the surface areas of rotation by applying integrals  | Area of a surface of revolution               | A lecture in the classroom | HW, CW, exam |

## 11. Course Evaluation

| Evaluation type | Degree |
|-----------------|--------|
| 4 quizzes       | 15     |
| 14 homework     | 15     |
| 10 classwork    | 10     |
| Term exam       | 10     |
| Final exam      | 50     |
| Total           | 100    |

## 12. Learning and Teaching Resources

|                                                                    |                            |
|--------------------------------------------------------------------|----------------------------|
| Required textbooks (curricular books, if any)                      | Calculus I By: Thomas      |
| Main references (sources)                                          | Calculus I By: Thomas 2018 |
| Recommended books and references (scientific journals, reports...) | -----                      |
| Electronic References, Websites                                    | -----                      |

## Course Description Form

|                                                                              |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                           |                               |                          |
|------------------------------------------------------------------------------|--------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|-------------------------------|--------------------------|
| <b>1. Course Name:</b>                                                       |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                           |                               |                          |
| Engineering mechanics I                                                      |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                           |                               |                          |
| <b>2. Course Code:</b>                                                       |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                           |                               |                          |
| DWRE 111                                                                     |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                           |                               |                          |
| <b>3. Semester / Year:</b>                                                   |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                           |                               |                          |
| 1/ 2025–2026                                                                 |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                           |                               |                          |
| <b>4. Description Preparation Date:</b>                                      |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                           |                               |                          |
| 1/9/2025                                                                     |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                           |                               |                          |
| <b>5. Available Attendance Forms:</b>                                        |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                           |                               |                          |
| Theoretical lectures in class                                                |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                           |                               |                          |
| <b>6. Number of Credit Hours (Total) / Number of Units (Total)</b>           |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                           |                               |                          |
| 4/6                                                                          |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                           |                               |                          |
| <b>7. Course administrator's name (mention all, if more than one name)</b>   |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                           |                               |                          |
| Name: Dr. Laith Khalil Ibrahim Al-Taie<br>Email: laith.altaie@uomosul.edu.iq |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                           |                               |                          |
| <b>8. Course Objectives</b>                                                  |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                           |                               |                          |
| <b>Course Objectives</b>                                                     |              | <ol style="list-style-type: none"> <li>1. To develop problem solving skills and understanding of Engineering mechanics (static) throughout the context of this course.</li> <li>2. To understand the principles of engineering mechanics I like vector and non-vector quantities, units conversion.</li> <li>3. This course also deals with force systems and their result.</li> <li>4. To understand the basics of equilibrium of objects.</li> <li>5. To understand force distribution in trusses and frames.</li> <li>6. To perform force analysis using the joint method and the section method. students are supposed to be familiar with the following points:               <ol style="list-style-type: none"> <li>1. Understanding vector and non–vector quantities, units conversion.</li> <li>2. Understanding force system and their resultant.</li> <li>3. Understanding the equilibrium.</li> <li>4. Understanding forces in trusses and frames.</li> </ol> </li> </ol> |                                                           |                               |                          |
| <b>9. Teaching and Learning Strategies</b>                                   |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                           |                               |                          |
| <b>Strategy</b>                                                              |              | The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering some challenging problems to motivate students.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                           |                               |                          |
| <b>10. Course Structure</b>                                                  |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                           |                               |                          |
| <b>Week</b>                                                                  | <b>Hours</b> | <b>Required Learning Outcomes</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <b>Unit or subject name</b>                               | <b>Learning method</b>        | <b>Evaluation method</b> |
| 1                                                                            | 4            | Principles of statics, 1- basic concepts, 2- vector and non-vector quantities, 3- Units and their conversion                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | General introduction on principles of engineering static. | Theoretical lectures in class | Exam                     |

|    |   |                                                                                                     |                                          |                               |           |
|----|---|-----------------------------------------------------------------------------------------------------|------------------------------------------|-------------------------------|-----------|
| 2  | 4 | Force systems and their result. 1-Force system, 2-Analysis                                          | Principles of force system and resultat. | Theoretical lectures in class | HW & Exam |
| 3  | 4 | 3- Result of the converging forces, 4- Moment force                                                 | Converging forces and moment             | Theoretical lectures in class | HW & Exam |
| 4  | 4 | 5- couples, Problem solving + Quiz 1                                                                | Couples                                  | Theoretical lectures in class | HW & Exam |
| 5  | 4 | 6- The result of non-converging forces                                                              | Non-converging forces                    | Theoretical lectures in class | HW & Exam |
| 6  | 4 | Equilibrium. 1-concept of Equilibrium, 2- free body diagram, 3- Balance of parallel forces + Quiz 2 | Equilibrium                              | Theoretical lectures in class | HW & Exam |
| 7  | 4 | 4 - Equilibrium of bodies on which non-converging forces are applied                                | Equilibrium of bodies                    | Theoretical lectures in class | HW & Exam |
| 8  | 4 | introduction about Trusses and Frames                                                               | Trusses and frames                       | Theoretical lectures in class | HW & Exam |
| 9  | 4 | Trusses and Frames. 1-Trusses: A- Joints method part 1                                              | Joint method                             | Theoretical lectures in class | HW & Exam |
| 10 | 4 | 1-Trusses: A- Joints method part 2 + Quiz 3                                                         | Joint method                             | Theoretical lectures in class | HW & Exam |
| 11 | 4 | Trusses: B – Section method part 1                                                                  | Section method                           | Theoretical lectures in class | HW & Exam |
| 12 | 4 | Trusses: B – Section method part 2 + Problem solving                                                | Section method                           | Theoretical lectures in class | HW & Exam |
| 13 | 4 | 2-Frames part 12-Frames part 1                                                                      | Frames                                   | Theoretical lectures in class | HW & Exam |
| 14 | 4 | 2-Frames part 2 + Quiz 4                                                                            | Frames                                   | Theoretical lectures in class | HW & Exam |
| 15 | 4 | Problem solving                                                                                     | Frames                                   | Theoretical lectures in class | HW & Exam |
| 16 | 4 | Preparatory week before the final Exam – review or open session for general questions               | General Over review                      | Theoretical lectures in class | -         |

### 11. Course Evaluation

| Evaluation type | Degree, % |
|-----------------|-----------|
| 4 quizzes       | 20        |
| 4 homework      | 20        |
| Term exam       | 10        |
| Final exam      | 50        |
| Total           | 100       |

### 12. Learning and Teaching Resources

|                                                                    |                                                                                                                                   |
|--------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| Required textbooks (curricular books, if any)                      | <ul style="list-style-type: none"> <li>Engineering mechanics – Static, Alanaz, H., Ministry of higher education, 1990.</li> </ul> |
| Main references (sources)                                          | <ul style="list-style-type: none"> <li>Engineering Mechanics: Statics &amp; Dynamics, 2022, Russell C. Hibbeler</li> </ul>        |
| Recommended books and references (scientific journals, reports...) | -----                                                                                                                             |
| Electronic References, Websites                                    | -----                                                                                                                             |

## Course Description Form

|                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Course Name:                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Engineering Drawing                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 2. Course Code:                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| DWRE 113                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 3. Semester / Year:                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| First/ 2025–2026                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 4. Description Preparation Date:                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 1/6/2025                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 5. Available Attendance Forms:                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Experimental lectures in lab.                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 6. Number of Credit Hours (Total) / Number of Units (Total)                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 90 hours/ 6 ECTS credits                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 7. Course administrator's name (mention all, if more than one name)                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Name: Dr. Ahmed A. M. Al-Ogaidi, Email: a.alogaidi@uomosul.edu.iq<br>Name: Ziyad Taher Ali, Email: ziyad.ali@uomosul.edu.iq<br>Name: Ahmed A. Ahmed Email: ahmad.alkatan84@gmail.com |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 8. Course Objectives                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Course Objectives</b>                                                                                                                                                             | <ul style="list-style-type: none"> <li>To inform students about the importance of engineering drawing and the essential instruments.</li> <li>To teach students different types of lines.</li> <li>To teach students the basic geometrical constructions.</li> <li>To introduce students to multi view drawing via theory of projection.</li> <li>To teach students 3D drawing based on Isometric concept.</li> <li>To imagine the complicated bodies by drawing sectional view.</li> </ul> |
| 9. Teaching and Learning Strategies                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Strategy</b>                                                                                                                                                                      | The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking                                                                                                                                                                                                                                                                                            |

skills. This will be achieved through classes, interactive tutorials and by considering some challenging problems to motivate students.

## 10. Course Structure

| Week  | Hours | Required Learning Outcomes                                                         | Unit or subject name                   | Learning method      | Evaluation method |
|-------|-------|------------------------------------------------------------------------------------|----------------------------------------|----------------------|-------------------|
| 1     | 6     | Use the drawing instruments perfectly. Recognize the types of line and their uses. | Drawing instruments and types of lines | A lecture in the lab | HW and CW         |
| 2-4   | 18    | Draw various geometric shapes depending on geometrical constructions.              | Basic geometric constructions          | A lecture in the lab | HW, CW, exam      |
| 5-9   | 30    | Understand the theory of projection to draw the views of a certain body.           | Theory of projection                   | A lecture in the lab | HW, CW, exam      |
| 10-13 | 24    |                                                                                    |                                        | A lecture in the lab | HW, CW, exam      |
| 14-15 | 12    |                                                                                    |                                        | A lecture in the lab | HW, CW, exam      |

## 11. Course Evaluation

| Evaluation type | Degree |
|-----------------|--------|
| 4 quizzes       | 16     |
| 14 homework     | 14     |
| 10 classwork    | 10     |
| Term exam       | 10     |
| Final exam      | 50     |
| Total           | 100    |

## 12. Learning and Teaching Resources

|                                                                    |                                                                                                                                                                                                                                                                                                                                                                                        |
|--------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Required textbooks (curricular books, if any)                      | French, T.E., Vierck, C.J. and Hang, R.I., 1978. The Fundamentals of Engineering Drawing and Graphic Technology. McGraw-Hill.                                                                                                                                                                                                                                                          |
| Main references (sources)                                          | <ul style="list-style-type: none"> <li>• Morling, K., 2010. Geometric and Engineering Drawing 3E. Routledge.</li> <li>• Hanifan, R., 2014. Perfecting engineering and technical drawing: Reducing errors and misinterpretations (Vol. 139). Springer.</li> </ul> Al-Khafaf, Abd Al-Rasul, Engineering Drawing, Technical University, Arabization and Publishing Centre, Baghdad, 1986. |
| Recommended books and references (scientific journals, reports...) | -----                                                                                                                                                                                                                                                                                                                                                                                  |
| Electronic References, Websites                                    | <a href="https://www.coursera.org/search?query=engineering%20drawing">https://www.coursera.org/search?query=engineering%20drawing</a>                                                                                                                                                                                                                                                  |

|                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. اسم المقرر:                                        | اللغة العربية 1 / Arabic Language1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 2. رمز المقرر:                                        | UOM 1011                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 3. الفصل / السنة:                                     | الأول / 2025-2026                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 4. تاريخ إعداد هذا الوصف                              | 2025/6/1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 5. أشكال الحضور المتاحة :                             | حضورياً                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 6. عدد الساعات الدراسية (الكلي)/ عدد الوحدات (الكلي): | عدد الساعات النظري (30)/ عدد الوحدات (2)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 7. اسم مسؤول المقرر الدراسي ( إذا أكثر من اسم يذكر)   | المدرس : م.د. ايناس عطوان سليمان                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| 8. اهداف المقرر                                       | <ul style="list-style-type: none"> <li>- التعرف على أساسيات قواعد اللغة العربية</li> <li>- اكساب الطالب المهارة في الكتابة العربية من تصحيح الأخطاء الواردة في الكتابة ومعرفة القواعد النحوية والاملائية التي تصون اللسان عن الخطأ</li> <li>- أن يفهم الطالب مدى أهمية اللغة العربية وقواعدها في الدراسات الانسانية وفي كتابة البحوث والتقارير</li> <li>- تنمية القدرة لدى المتعلم على التحدث باللغة العربية، ما أمك</li> <li>- تزويد المتعلم بالمادة اللغوية والمفاهيم الفكرية والمعارف الاملائية والنحوية والدلالية بحيث يتمكن بها من فهم واستيعاب النصوص وتطبيقها على أساليب الكلام</li> <li>- تمكين الطالب من القراءة الصحيحة.</li> </ul> |
| 9. استراتيجيات التعليم والتعلم                        | <ul style="list-style-type: none"> <li>- الكتاب المنهجي.</li> <li>- الحلقات النقاشية</li> <li>- خلق محاضرة تفاعلية بين الطالب والأستاذ في عرض المادة</li> <li>- استعمال البور بوينت في توضيح موضوعات الدرس.</li> <li>- تكليف الطالب ببعض الأنشطة والواجبات.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                        |
| 10. بنية المقرر                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

| الأسبوع | المساعات | مخرجات التعلم المطلوبة                                                                    | اسم الوحدة / أو الموضوع                                     | طريقة التعليم   | طريقة التقييم                                                                             |
|---------|----------|-------------------------------------------------------------------------------------------|-------------------------------------------------------------|-----------------|-------------------------------------------------------------------------------------------|
| 1       | 2        | A1 : أن يعرف الطالب الكلمة ثم يذكر أقسامها (الاسم - الفعل - والحرف)                       | اللغة العربية / أقسام الكلمة وتعريفاتها                     | محاضرات وتقارير | الامتحانات اليومية،<br>الواجبات،<br>النقاش وحل التمارين<br>داخل المحاضرة،<br>تفاعل الطالب |
| 2       | 2        | A4 : أن يفرق الطالب بين همزتين القطع والوصل في اللفظ والكتابة                             | النطق بجملة القطع والوصل                                    | محاضرات         | الامتحانات اليومية،<br>الواجبات،<br>النقاش وحل التمارين<br>داخل المحاضرة،<br>تفاعل الطالب |
| 3       | 2        | A5 : أن يميز الطالب في كتابة القواعد الأساسية لكتابة الهمزة بالشكل الصحيح                 | قواعد كتابة الهمزة                                          | محاضرات         | الامتحانات اليومية،<br>الواجبات،<br>النقاش وحل التمارين<br>داخل المحاضرة،                 |
| 4       | 2        | A4 : أن يفرق الطالب في كتابة التاء المربوطة والتاء المفتوحة في آخر الاسماء                | كتابة التاء في آخر الكلمة                                   | محاضرات         | واجب بيتي                                                                                 |
| 5       | 2        | B6 : أن يبحث الطالب في المعاجم عن الخطوات التي يجب اتباعها عند الحاجة لمعرفة معنى كلمة ما | طريقة الكشف عن الكلمات في المعاجم العربية                   | محاضرات         | الامتحانات اليومية،<br>الواجبات،<br>النقاش وحل التمارين<br>داخل المحاضرة،<br>تفاعل الطالب |
| 6       | 2        | A5 : أن يميز الطالب ويبين الفرق بين المبني والمعرب وعلامات الأعراب الأصلية والفرعية       | المبني والمعرب وعلامات الأعراب الأصلية والفرعية             | محاضرات         | الامتحانات اليومية،<br>الواجبات،<br>النقاش وحل التمارين<br>داخل المحاضرة،<br>تفاعل الطالب |
| 7       | 2        | A2 : أن يفهم الطالب الجزئين الرئيسيين للجملة الاسمية وهما المبتدأ والخبر                  | الجملة الاسمية                                              | محاضرات         | الامتحانات اليومية،<br>الواجبات،<br>النقاش وحل التمارين<br>داخل المحاضرة،<br>تفاعل الطالب |
| 8       | 2        | C1 : أن يوضح للطالب أهم الاختلافات بين أفعال المقاربة والرجاء وعملها للجملة الاسمية       | أفعال المقاربة والرجاء والشروع                              | محاضرات         | الامتحانات اليومية،<br>الواجبات،<br>النقاش وحل التمارين<br>داخل المحاضرة،<br>تفاعل الطالب |
| 9       | 2        | A5 : أن يميز الطالب بين الأعداد العربية والأعداد المبنية ويميز كذلك بين العرفة والنكره    | أحكام العدد من حيث الأعراب والبناء ومن حيث التعريف والتنكير | حل تمارين       | اختبار شفهي                                                                               |
| 10      | 2        | A1 : أن يعرف الطالب أهمية علامات الترقيم في الكتابة                                       | علامات الترقيم                                              | محاضرات         | الامتحانات اليومية،<br>الواجبات،                                                          |

|                                                                                           |         |                          |                                                                                           |   |    |
|-------------------------------------------------------------------------------------------|---------|--------------------------|-------------------------------------------------------------------------------------------|---|----|
| النقاش وحل التمارين<br>داخل المحاضرة،<br>تفاعل الطالب                                     |         |                          |                                                                                           |   |    |
| الامتحانات اليومية،<br>الواجبات،<br>النقاش وحل التمارين<br>داخل                           | محاضرات | الأخطاء اللغوية          | B2 : ان يظهر الفرق بين الاخطاء الاملائية<br>والاخطاء اللغوية في الكتابة                   | 2 | 11 |
| الامتحانات اليومية،<br>الواجبات،<br>النقاش وحل التمارين<br>داخل المحاضرة،<br>تفاعل الطالب | محاضرات | الافعال الناقصة          | A2 : أن يشرح الطالب الافعال الناقصة والتغير<br>الذي يحدث على الجملة الاسمية بدخولها عليها | 2 | 12 |
| الامتحانات اليومية،<br>الواجبات،<br>النقاش وحل التمارين<br>داخل المحاضرة،<br>تفاعل الطالب | محاضرات | النطق كتابة الضاد والطاء | C7: ان يبين الفرق بالنطق بين حرفين الضاد<br>والطاء                                        | 2 | 13 |
| الامتحانات اليومية،<br>الواجبات،<br>النقاش وحل التمارين<br>داخل المحاضرة،<br>تفاعل الطالب | محاضرات | التغاير الصرفي           | A2 : ان يصنف الطالب الفرق بين المنقوص<br>والمقصور والممدود                                | 2 | 14 |
| واجب بيتي                                                                                 | محاضرات | الشعر وانواعه            | B8 : يكتب نبذة عن عناصر الشعر                                                             | 2 | 15 |

|                                                                                                                                                                                                                                                                                                    |                                                                        |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------|
| 11. تقييم المقرر                                                                                                                                                                                                                                                                                   |                                                                        |
| الحضور 1%<br>الواجبات 4%<br>اختبارات قصيرة (Quiz) 5%<br>(الاسبوع الثالث، الاسبوع الخامس، الاسبوع السابع، الاسبوع التاسع، الاسبوع الحادي عشر)<br>امتحان فصلي اول 15% (الاسبوع السادس)<br>امتحان فصلي ثاني 15% (الاسبوع الرابع عشر)<br>درجة السعي 40%<br>الامتحان نهائي 60 %<br>الدرجة النهائية 100% |                                                                        |
| 12. مصادر التعلم والتدريس                                                                                                                                                                                                                                                                          |                                                                        |
| النحو الوافي - عباس حسن                                                                                                                                                                                                                                                                            | الكتب المقررة المطلوبة ( المنهجية أن وجدت )                            |
| كتاب النحو المبسط، للشيخ ادهم العاسمي                                                                                                                                                                                                                                                              | المراجع الرئيسية ( المصادر )                                           |
| لا يوجد                                                                                                                                                                                                                                                                                            | الكتب والمراجع الساندة التي يوصى بها (المجلات العلمية، التقارير .... ) |
| لا يوجد                                                                                                                                                                                                                                                                                            | المراجع الإلكترونية، مواقع الانترنت                                    |

## Course Description Form

### 1. Course Name:

Introduction to Water Resources Engineering

| 2. Course Code:                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                   |                                                                                                                                                                                            |                                      |                           |
|-----------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|---------------------------|
| DWRE 114                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                   |                                                                                                                                                                                            |                                      |                           |
| 3. Semester / Year:                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                   |                                                                                                                                                                                            |                                      |                           |
| First/ 2025-2026                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                   |                                                                                                                                                                                            |                                      |                           |
| 4. Description Preparation Date:                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                   |                                                                                                                                                                                            |                                      |                           |
| 18/4/2025                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                   |                                                                                                                                                                                            |                                      |                           |
| 5. Available Attendance Forms:                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                   |                                                                                                                                                                                            |                                      |                           |
| A theoretical lecture in the classroom                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                   |                                                                                                                                                                                            |                                      |                           |
| 6. Number of Credit Hours (Total) / Number of Units (Total)                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                   |                                                                                                                                                                                            |                                      |                           |
| 75 hours/ 3 ECTS credits                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                   |                                                                                                                                                                                            |                                      |                           |
| 7. Course administrator's name (mention all, if more than one name)                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                   |                                                                                                                                                                                            |                                      |                           |
| Name: Abdulghani Khalaf Mohammed, Email: <a href="mailto:Alrobaai1982@uomosul.edu.iq">Alrobaai1982@uomosul.edu.iq</a> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                   |                                                                                                                                                                                            |                                      |                           |
| 8. Course Objectives                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                   |                                                                                                                                                                                            |                                      |                           |
| Course Objectives                                                                                                     | <ul style="list-style-type: none"> <li>• Introducing students to the importance of water resources for human life and what is the primary role of the dams and water resources engineer in managing and developing these resources and ways to preserve them.</li> <li>• Introducing students to the basic principles of irrigation and drainage engineering, modern and ancient irrigation methods, and ways to preserve water wealth.</li> <li>• Introducing students to the basic principles of studying fluid flow in pipes and open channels and the most important methods used to measure and control it.</li> <li>• Introducing the student to the concept of the hydrological cycle, the movement of water above and below the surface of the earth, and the study of evaporation from the surface of the soil and the surface of free water and the effect of weather factors on it.</li> </ul> |                                                                                                   |                                                                                                                                                                                            |                                      |                           |
| 9. Teaching and Learning Strategies                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                   |                                                                                                                                                                                            |                                      |                           |
| Strategy                                                                                                              | The main strategy that will be adopted in offering this course is to familiarize the student with the basic principles of the three branches (irrigation and drainage, hydraulics and hydrology) in the field of dams and water resources, to be an introduction that helps the student to delve deeper into the study of these disciplines in the next academic stages. At the same time, improving and expanding critical thinking skills, and introducing him to the importance of water resources in achieving a decent life for humanity. This is achieved through theoretical lectures, scientific reports, field visits, and interactive panel discussions.                                                                                                                                                                                                                                        |                                                                                                   |                                                                                                                                                                                            |                                      |                           |
| 10. Course Structure                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                   |                                                                                                                                                                                            |                                      |                           |
| Week                                                                                                                  | Hours                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Required Learning Outcomes                                                                        | Unit or subject name                                                                                                                                                                       | Learning method                      | Evaluation method         |
| 1                                                                                                                     | 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | General introduction to the Department of Dams and Water Resources Engineering and the curriculum | A brief overview of the three branches of the Department of Water Dam Engineering                                                                                                          | Theoretical lecture in the classroom |                           |
| 2-5                                                                                                                   | 12                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | An introductory introduction to the basic principles of hydrology                                 | Phases of the hydrological cycle/ Irrigation water sources/ Floods/ Dams and reservoirs / Types of Water reservoirs/Types of dams /catchment area /Classification of dams/Water sources in | Theoretical lecture in the classroom | Quizzes in the fifth week |

|       |    |                                                                                 |                                                                                                                                                                                                                                                                                                                                                          |                                             |                                                                                   |
|-------|----|---------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|-----------------------------------------------------------------------------------|
|       |    |                                                                                 | Iraq/Control and storage projects/Executed large dams.                                                                                                                                                                                                                                                                                                   |                                             |                                                                                   |
| 6-10  | 15 | An introductory introduction to the basic principles of hydraulics              | Hydraulic Structures/ Methods for measuring flow in open channels and pipes/Volumetric Measurements for discharge Measurement/ Velocity-Area Method for discharge Measurement/ Hydraulic Structures for discharge Measurement                                                                                                                            | <b>Theoretical lecture in the classroom</b> | Quizzes in the tenth week & Mid-course exam in the eighth week                    |
| 11-15 | 15 | An introductory introduction to the basic principles of irrigation and drainage | Irrigation projects in Iraq/Estimation of water consumption/Evapotranspiration/yield coefficient/Surface irrigation/sprinkler irrigation/ drip irrigation/Soil physical properties. Soil water forms/ Soil moisture content conventions/ Soil moisture content. irrigation efficiency/Water conduction efficiency/ water and consistency of distribution | <b>Theoretical lecture in the classroom</b> | Quizzes in the fifteenth week & Receiving scientific reports in the eleventh week |

## 11. Course Evaluation

| <b>Evaluation type</b> | <b>Degree</b> |
|------------------------|---------------|
| 3 quizzes              | 15            |
| 3 homework             | 15            |
| 1 Scientific report    | 10            |
| Midterm exam           | 10            |
| Final exam             | 50            |
| Total                  | 100           |

## 12. Learning and Teaching Resources

|                                                                           |                                                                                                                                       |
|---------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|
| <b>Required textbooks (curricular books, if any)</b>                      | Irrigation and drainage book in Iraq and the Arab world. Written by Dr. Najeeb Kharofa, Dr. Mahdi Al-Sahhaf, Dr. Wafiq Al-Khashab     |
| <b>Main references (sources)</b>                                          | On-farm irrigation systems engineering\by A.Y.Hachum, and H.I.Yasin. textbook- Mosul University,1992.                                 |
| <b>Recommended books and references (scientific journals, reports...)</b> | -----                                                                                                                                 |
| <b>Electronic References, Websites</b>                                    | <a href="https://www.coursera.org/search?query=engineering%20drawing">https://www.coursera.org/search?query=engineering%20drawing</a> |

## Course Description Form

|                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                        |
|-----------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>1. Course Name:</b>                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                        |
| Computer 1                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>2. Course Code:</b>                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                        |
| UOM 1031                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>3. Semester / Year:</b>                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                        |
| First semester / 2024-2025                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>4. Description Preparation Date:</b>                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                        |
| 1/6/2023                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>5. Available Attendance Forms:</b>                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                        |
| Theoretical & Experimental lectures in Computer lab.                                                                              |                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>6. Number of Credit Hours (Total) / Number of Units (Total)</b>                                                                |                                                                                                                                                                                                                                                                                                                                                                                        |
| 75 hours/ 3 ECTS credits                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>7. Course administrator's name (mention all, if more than one name)</b>                                                        |                                                                                                                                                                                                                                                                                                                                                                                        |
| Name: Dr. Talal Ahmed Basheer<br>Email: t.basheer@uomosul.edu.iq<br>Name: Omar Kanaan Taha<br>Email: omar.alsultan@uomosul.edu.iq |                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>8. Course Objectives</b>                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Course Objectives</b>                                                                                                          | The Module aim is to prepare student to deal with computers. In addition to, teach the student the fundamentals of computers and its components. Furthermore, learning how to use two of Microsoft Office applications (Word and Excel).                                                                                                                                               |
| <b>9. Teaching and Learning Strategies</b>                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Strategy</b>                                                                                                                   | The main strategy that will be adopted in delivering this module is to encourage students' participation in the Lab activities, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, laboratory and by considering type of external search involving some of computer technology that are interesting to the students. |

## 10. Course Structure

| Week | Hours | Required Learning Outcomes                          | Unit or subject name                  | Learning method                             | Evaluation method |
|------|-------|-----------------------------------------------------|---------------------------------------|---------------------------------------------|-------------------|
| 1-2  | 6     | Understand Computers and its components             | Computers and Operating System        | Theoretical & Experimental lectures in lab. | Exam and CW       |
| 3-4  | 6     | Understand Computers and its components (Continued) | Software and Hardware Interaction     | Theoretical & Experimental lectures in lab. | CW                |
| 5    | 3     | Understand Computers and its components (Continued) | Windows File Management               | Theoretical & Experimental lectures in lab. | CW & HW           |
| 6    | 3     | Understand Computers and its components (Continued) | Operating System Customization        | Theoretical & Experimental lectures in lab. | CW                |
| 7-8  | 6     | Understand Computers and its components (Continued) | Computer Hardware                     | Theoretical & Experimental lectures in lab. | Exam and CW       |
| 9-10 | 6     | Exploring Microsoft Office 2013                     | Exploring Microsoft Office 2013       | Theoretical & Experimental lectures in lab. | CW                |
| 11   | 3     | Learning to use Microsoft Word                      | Getting Started with Word Essentials  | Theoretical & Experimental lectures in lab. | CW & HW           |
| 12   | 3     | Learning to use Microsoft Word (Continued)          | Editing and Formatting Documents      | Theoretical & Experimental lectures in lab. | Exam and CW       |
| 13   | 3     | Learning to use Microsoft Excel                     | Getting Started with Excel Essentials | Theoretical & Experimental                  | CW                |

|    |   |                                             |                                     |                                             |             |
|----|---|---------------------------------------------|-------------------------------------|---------------------------------------------|-------------|
|    |   |                                             |                                     | lectures in lab.                            |             |
| 14 | 3 | Learning to use Microsoft Excel (Continued) | Organizing and Enhancing Worksheets | Theoretical & Experimental lectures in lab. | CW          |
| 15 | 3 | Learning to use Microsoft Excel (Continued) | Creating Formulas and Charting Data | Theoretical & Experimental lectures in lab. | Exam and CW |

### 11. Course Evaluation

| Evaluation type     |  | Degree |
|---------------------|--|--------|
| 2 quizzes           |  | 10     |
| 2 homework          |  | 5      |
| Report              |  | 5      |
| Continues classwork |  | 20     |
| Term exam           |  | 10     |
| Final exam          |  | 50     |
| Total               |  | 100    |

### 12. Learning and Teaching Resources

|                                                                    |                                                                                                                                                   |
|--------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| Required textbooks (curricular books, if any)                      |                                                                                                                                                   |
| Main references (sources)                                          | 2015 Computer Literacy BASICS: A Comprehensive Guide to IC3<br>Connie Morrison, Dolores Wells, Lisa Ruffolo<br>Cengage Learning. ISBN: 128576658X |
| Recommended books and references (scientific journals, reports...) | IC3 GS5 Certification Guide Using Windows 10 & Office 2016                                                                                        |
| Electronic References, Websites                                    | Google Classroom                                                                                                                                  |

## Course Description Form

|                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                     |                             |                        |                          |
|----------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|------------------------|--------------------------|
| <b>1. Course Name:</b>                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                     |                             |                        |                          |
| geology                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                     |                             |                        |                          |
| <b>2. Course Code:</b>                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                     |                             |                        |                          |
| DWRE 117                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                     |                             |                        |                          |
| <b>3. Semester / Year:</b>                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                     |                             |                        |                          |
| 1/2024-2025                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                     |                             |                        |                          |
| <b>4. Description Preparation Date:</b>                                    |                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                     |                             |                        |                          |
| 1/9/2023                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                     |                             |                        |                          |
| <b>5. Available Attendance Forms:</b>                                      |                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                     |                             |                        |                          |
| Theoretical lectures in class and on line                                  |                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                     |                             |                        |                          |
| <b>6. Number of Credit Hours (Total) / Number of Units (Total)</b>         |                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                     |                             |                        |                          |
| 3/3                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                     |                             |                        |                          |
| <b>7. Course administrator's name (mention all, if more than one name)</b> |                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                     |                             |                        |                          |
| Name: Ghada y. Abdullah      Email : g.alobaidy@uomosul.edu.iq             |                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                     |                             |                        |                          |
| Name: Arwaa A.Jamal      Email :Arwa.abdalrazzaq@uomosul.edu.iq            |                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                     |                             |                        |                          |
| <b>8. Course Objectives</b>                                                |                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                     |                             |                        |                          |
| <b>Course Objectives</b>                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                              | 5. To understand the types of Rocks and Engineering properties<br>6. Define hydrogeology and Hydrologic budget<br>7. Distinguish between Types of aquifers<br>8. This course deals with the basic concept of Geologic formations as aquifers.<br>9. Calculate Porosity of rocks or soils in aquifers, groundwater movement, Permeability and Hydraulic Conductivity |                             |                        |                          |
| <b>9. Teaching and Learning Strategies</b>                                 |                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                     |                             |                        |                          |
| <b>Strategy</b>                                                            | The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of exercises involving some problems that are interesting to the students in Soil, Rocks and the water move underground scope. |                                                                                                                                                                                                                                                                                                                                                                     |                             |                        |                          |
| <b>10. Course Structure</b>                                                |                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                     |                             |                        |                          |
| <b>Week</b>                                                                | <b>Hours</b>                                                                                                                                                                                                                                                                                                                                                                                                                 | <b>Required Learning Outcomes</b>                                                                                                                                                                                                                                                                                                                                   | <b>Unit or subject name</b> | <b>Learning method</b> | <b>Evaluation method</b> |

|    |   |                                                                                                   |                                                                          |                                  |                 |
|----|---|---------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|----------------------------------|-----------------|
| 1  | 3 | Identify the origin of the Earth's formation and the minerals it contains (i)                     | Earth's crust and components of the earth's crust, minerals and crystals | Theoretical lectures in class    |                 |
| 2  | 3 | Distinguishing between rock types (i)                                                             | Igneous rocks                                                            | Theoretical lectures dnd on line | exam + homework |
| 3  | 3 |                                                                                                   | Metamorphic rocks, sedimentary rocks                                     | Theoretical lectures in class    | H.W & Exam      |
| 4  | 3 | Identifying soil types from a geological and engineering perspective                              | Erosion, sculpting and soil formation                                    | Theoretical lectures in class    | H.W             |
| 5  | 3 | Knowledge of soil properties through which soil permeability and moisture content are known (iii) | geological structures                                                    | Theoretical lectures in class    | H.W             |
| 6  | 3 | Description of hydrogeology and hydrological budget.(iii)                                         | Engineering properties of rocks                                          | Theoretical lectures in class    | Exam            |
| 7  | 3 | Identify the properties of rocks that have the ability to store groundwater (i)                   | Mechanical properties of rocks                                           | Theoretical lectures in class    | Monthly exam    |
| 8  | 3 | Identifying and distinguishing between groundwater layers. (i)                                    | Introduction to hydrogeology                                             | Theoretical lectures in class    |                 |
| 9  | 3 | Learn about the meaning of the term hydrology                                                     | Hydrologic budget                                                        | Theoretical lectures in class    |                 |
| 10 | 3 | Introducing the student to the                                                                    | Rock properties affecting groundwater                                    | Theoretical lectures in class    | Discuss reports |

|    |   |                                                                                           |                                         |  |     |
|----|---|-------------------------------------------------------------------------------------------|-----------------------------------------|--|-----|
|    |   | concept of water budget                                                                   |                                         |  |     |
| 11 | 3 | Knowing the types of rocks that have the ability to store water                           | Types of aquifers                       |  | H.W |
| 12 | 3 | Determine the porosity of rocks or soil in aquifers and the movement of groundwater.(iii) | Geologic formations as aquifers         |  | H.W |
| 13 | 3 | Explain the basic concept of geological formations of aquifers. (i)                       | Porosity of rocks or soils in aquifers  |  | H.W |
| 14 | 3 | Apply Darcy's equation to calculate hydraulic conductivity (iii)                          | groundwater movement                    |  |     |
| 15 | 3 | Knowing the depth of groundwater in the layers of the earth                               | Permeability and Hydraulic Conductivity |  |     |

#### 11. Course Evaluation

| Evaluation type | Degree |
|-----------------|--------|
| 2 quizzes(3)    | 12     |
| Assignments(5)  | 10     |
| Report          | 8      |
| Term exam(2)    | 20     |
| Final exam      | 50     |
| Total           | 100    |

#### 12. Learning and Teaching Resources

|                                               |                                                                                                                                                          |
|-----------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| Required textbooks (curricular books, if any) | “STUDY GUIDE FOR A BEGINNING COURSE IN GROUND-WATER HYDROLOGY” PART II. by O. Lehn Franke, Thomas E. Reilly, Ralph J. Haefner, and Dale L. Simmons. U.S. |
|-----------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|

|                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|--------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                    | <p>GEOLOGICAL SURVEY. Reston, Virginia 1993.</p> <p>•</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Main references (sources)                                          | <p>“Basic Ground-Water Hydrology”. RALPH C. HEATH. Prepared in cooperation with the North Carolina Department of Natural Resources and Community Development. Tenth printing, 2004.</p> <p>Ground Water”. R. Allan Freeze and John A. Cherry. Printed in the United States of America. 1979 by Prentice-Hall. Inc., Englewood Cliffs, N.J.</p> <p>“Groundwater Hydrology”. K.R. Rushton. 2003 John Wiley &amp; Sons Ltd, the Atrium, Southern Gate, Chichester.</p> <p>“The Handbook of Groundwater Engineering”. John H. Cushman, Daniel M. Tartakovsky. Published online on: 07 Nov 2016.</p> |
| Recommended books and references (scientific journals, reports...) | -----                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Electronic References, Websites                                    | -----                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

## Course Description Form

|                                                                            |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                             |                            |                          |
|----------------------------------------------------------------------------|--------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|----------------------------|--------------------------|
| <b>1. Course Name:</b>                                                     |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                             |                            |                          |
| Mathematics II                                                             |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                             |                            |                          |
| <b>2. Course Code:</b>                                                     |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                             |                            |                          |
| DWRE 121                                                                   |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                             |                            |                          |
| <b>3. Semester / Year:</b>                                                 |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                             |                            |                          |
| First/ 2025–2026                                                           |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                             |                            |                          |
| <b>4. Description Preparation Date:</b>                                    |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                             |                            |                          |
| 1/6/2025                                                                   |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                             |                            |                          |
| <b>5. Available Attendance Forms:</b>                                      |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                             |                            |                          |
| Lectures in the classroom                                                  |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                             |                            |                          |
| <b>6. Number of Credit Hours (Total) / Number of Units (Total)</b>         |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                             |                            |                          |
| 93 hours/ 6 ECTS credits                                                   |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                             |                            |                          |
| <b>7. Course administrator's name (mention all, if more than one name)</b> |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                             |                            |                          |
| Name:Ahmed yahay Abdulhafedh, Email: ahmed.abdulhafedh@uomosul.edu.iq      |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                             |                            |                          |
| <b>8. Course Objectives</b>                                                |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                             |                            |                          |
| <b>Course Objectives</b>                                                   |              | Knowledge of the Transcendental Functions, Inverse Functions, Derivatives and integral of inv trigonometric functions, Exponential and logarithmic functions, Derivatives and integrals invol logarithmic and exponential functions, Graphs and applications involving logarithmic and exponer functions, Hyperbolic functions, Hopital's Rule, An overview of integration methods: Trigonome substitutions, Trigonometric integral, Integration by parts, Integrating rational functions by partial fracti Numerical integration; Simpson's rule and Improper integrals. |                                                             |                            |                          |
| <b>9. Teaching and Learning Strategies</b>                                 |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                             |                            |                          |
| <b>Strategy</b>                                                            |              | The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering some challenging problems to motivate students.                                                                                                                                                                                                                                  |                                                             |                            |                          |
| <b>10. Course Structure</b>                                                |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                             |                            |                          |
| <b>Week</b>                                                                | <b>Hours</b> | <b>Required Learning Outcomes</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <b>Unit or subject name</b>                                 | <b>Learning method</b>     | <b>Evaluation method</b> |
| 1                                                                          | 6            | The student learns how to address transcendental functions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Transcendental Functions                                    | A lecture in the classroom | HW and CW                |
| 2                                                                          | 6            | The student learned how to derive and integrate inverse function equations                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Inverse Functions                                           | A lecture in the classroom | HW, CW, exam             |
| 3                                                                          | 6            | The student learned how to solve integrals and inverse trigonometric functions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Derivatives and integral of inverse trigonometric functions | A lecture in the classroom | HW, CW, exam             |

|       |    |                                                                                                            |                                                                                                                                                                                                                                |                            |              |
|-------|----|------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|--------------|
| 4     | 6  | The student learned to solve exponential and logarithmic functions                                         | Exponential and logarithmic functions                                                                                                                                                                                          | A lecture in the classroom | HW, CW, exam |
| 5-7   | 18 | The student learned how to solve derivatives and integrals involving logarithmic and exponential functions | Derivatives and integrals involving logarithmic and exponential functions,                                                                                                                                                     | A lecture in the classroom | HW, CW, exam |
| 8-9   | 12 | The student learned how to draw applications and solutions of hyperbolic functions                         | Graphs and applications involving logarithmic and exponential functions, Hyperbolic functions                                                                                                                                  | A lecture in the classroom | HW, CW, exam |
| 10    | 6  | The student learned how to solve limits using L'Hopital's rule                                             | Hopital's Rule                                                                                                                                                                                                                 | A lecture in the classroom | HW, CW, exam |
| 11-15 | 30 | The student learned how to apply integrals that cannot be solved by direct application                     | An overview of integration methods: Trigonometric substitutions, Trigonometric integral, Integration by parts, Integrating rational functions by partial fractions, Numerical integration; Simpson's rule, Improper integrals. | A lecture in the classroom | HW, CW, exam |

### 11. Course Evaluation

| Evaluation type | Degree |
|-----------------|--------|
| 4 quizzes       | 15     |
| 14 homework     | 15     |
| 10 classwork    | 10     |
| Term exam       | 10     |
| Final exam      | 50     |
| Total           | 100    |

### 12. Learning and Teaching Resources

|                                                                    |                            |
|--------------------------------------------------------------------|----------------------------|
| Required textbooks (curricular books, if any)                      | Calculus I By: Thomas      |
| Main references (sources)                                          | Calculus I By: Thomas 2018 |
| Recommended books and references (scientific journals, reports...) | -----                      |
| Electronic References, Websites                                    | -----                      |

## Course Description Form

|                         |
|-------------------------|
| 1. Course Name:         |
| Engineering mechanics 2 |
| 2. Course Code:         |
| DWRE 122                |
| 3. Semester / Year:     |

2025–2026

4. Description Preparation Date:

1/9/2025

5. Available Attendance Forms:

Theoretical lectures in class

6. Number of Credit Hours (Total) / Number of Units (Total)

4/6

7. Course administrator's name (mention all, if more than one name)

Name: Dr. Laith Khalil Ibrahim Al-Taie

Email: laith.altaie@uomosul.edu.iq

8. Course Objectives

Course Objectives

1. To develop problem solving skills and understanding of Engineering mechanics (dynamic) throughout the context of this course.
2. To understand the principles of engineering mechanics II like friction principals and types
3. This course also deals with Centers and Centers of Gravity of bodies.
4. To understand the basics of moment of Inertia.

9. Teaching and Learning Strategies

Strategy

The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering some challenging problems to motivate students.

10. Course Structure

| Week | Hours | Required Learning Outcomes     | Unit or subject name                                                                                                             | Learning method               | Evaluation method |
|------|-------|--------------------------------|----------------------------------------------------------------------------------------------------------------------------------|-------------------------------|-------------------|
| 1    | 4     | Friction                       | The nature of friction, mechanical friction, Coefficient of Friction, Friction issues                                            | Theoretical lectures in class | Exam              |
| 2    | 4     | Friction                       | wedges, Frictional forces in the belts                                                                                           | Theoretical lectures in class | HW & Exam         |
| 3    | 4     | Centers and Centers of Gravity | The importance of centers, Centers of spaces and lines, Determination of centers by integration, Centers of compound shapes      | Theoretical lectures in class | HW & Exam         |
| 4    | 4     | Problem solving                |                                                                                                                                  | Theoretical lectures in class |                   |
| 5    | 4     | <b>Moment of Inertia</b>       | Units of measurement and signals, The moment of polar inertia, swirl radius, The equation for transferring the moment of inertia | Theoretical lectures in class | HW & Exam         |
| 6    | 4     | <b>Moment of Inertia</b>       | Moment of Inertia by Integration, The factorial of inertia, Maximum and minimum values of                                        | Theoretical lectures in class | HW & Exam         |

|    |   |                                                                                       |                                             |                               |           |
|----|---|---------------------------------------------------------------------------------------|---------------------------------------------|-------------------------------|-----------|
|    |   |                                                                                       | moment of inertia (Mohr circuit)            |                               |           |
| 7  | 4 | Problem solving                                                                       |                                             | Theoretical lectures in class |           |
| 8  | 4 | <b>introduction Kinematics of Particles</b>                                           | <b>introduction Kinematics of Particles</b> | Theoretical lectures in class | HW & Exam |
| 9  | 4 | <b>introduction Kinematics of Particles</b>                                           | Rectilinear motion                          | Theoretical lectures in class | HW & Exam |
| 10 | 4 | <b>introduction Kinematics of Particles</b>                                           | Plane curvilinear motion                    | Theoretical lectures in class | HW & Exam |
| 11 | 4 | Circular motion                                                                       | Circular motion                             | Theoretical lectures in class | HW & Exam |
| 12 | 4 | Dynamic friction                                                                      | Dynamic friction                            | Theoretical lectures in class | HW & Exam |
| 13 | 4 | <b>Work and energy</b>                                                                | Equations, Work and energy applications     | Theoretical lectures in class | HW & Exam |
| 14 | 4 | Power                                                                                 | Power and Efficiency                        | Theoretical lectures in class | HW & Exam |
| 15 | 4 | Problem solving                                                                       |                                             | Theoretical lectures in class | HW & Exam |
| 16 | 4 | Preparatory week before the final Exam – review or open session for general questions | General Over review                         | Theoretical lectures in class | -         |

## 11. Course Evaluation

| Evaluation type | Degree, % |
|-----------------|-----------|
| 4 quizzes       | 20        |
| 4 homework      | 20        |
| Term exam       | 10        |
| Final exam      | 50        |
| Total           | 100       |

## 12. Learning and Teaching Resources

|                                                                    |                                                                                                                            |
|--------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|
| Required textbooks (curricular books, if any)                      | Engineering mechanics – dynamic, Alanaz, H., Ministry of higher education, 1990.                                           |
| Main references (sources)                                          | <ul style="list-style-type: none"> <li>Engineering Mechanics: Statics &amp; Dynamics, 2022, Russell C. Hibbeler</li> </ul> |
| Recommended books and references (scientific journals, reports...) | -----                                                                                                                      |
| Electronic References, Websites                                    | -----                                                                                                                      |

## Course Description Form

|                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|-----------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>1. Course Name:</b>                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Computer Drawing                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>2. Course Code:</b>                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| DWRE 123                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>3. Semester / Year:</b>                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Second semester / 2025–2026                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>4. Description Preparation Date:</b>                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 1/9/2025                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>5. Available Attendance Forms:</b>                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Theoretical & Experimental lectures in lab.                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>6. Number of Credit Hours (Total) / Number of Units (Total)</b>                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 150 hours/ 6 ECTS credits                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>7. Course administrator's name (mention all, if more than one name)</b>                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Name: Dr. Talal Ahmed Basheer<br>Email: t.basheer@uomosul.edu.iq<br>Name: Omar Kanaan Taha<br>Email: omar.alsultan@uomosul.edu.iq |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>8. Course Objectives</b>                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Course Objectives</b>                                                                                                          | <p>The module aims to shed light on how to use one of the most important computer aided drawing software - AutoCAD software - reviewing the most important information that the users need to utilize the most common program vision, to produce and extract 2D and 3D drawings.</p> <p>Qualifying students of the Dams and Water Resources Engineering Department to use the AutoCAD software to competently and efficiently realize engineering drawings, and assist them in implementing the details of the designs required in their projects.</p> |
| <b>9. Teaching and Learning Strategies</b>                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Strategy</b>                                                                                                                   | <p>The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials.</p>                                                                                                                                                                                                                                                                          |

| 10. Course Structure |       |                                                          |                                                                                                                            |                      |                   |
|----------------------|-------|----------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|----------------------|-------------------|
| Week                 | Hours | Required Learning Outcomes                               | Unit or subject name                                                                                                       | Learning method      | Evaluation method |
| 1                    | 6     | Learn the basics of coordinate systems & AutoCAD program | Introduction - AutoCAD program interface elements, Coordinate systems in the program, Drafting Settings: Grid, Snap, Ortho | A lecture in the lab | CW                |
| 2                    | 6     | Learn the AutoCAD drawing commands                       | Drawing commands: Line, Circle                                                                                             | A lecture in the lab | CW                |
| 3                    | 6     | Learn the AutoCAD drawing commands (Continued)           | Drawing commands: Polygon, Rectangle                                                                                       | A lecture in the lab | CW & Exam         |
| 4                    | 6     | Learn the AutoCAD Modifying commands                     | Modify tools: Erase, Copy, Move                                                                                            | A lecture in the lab | CW                |
| 5                    | 6     | Learn the AutoCAD Modifying commands (Continued)         | Modify tools: Mirror, Rotate, Scale                                                                                        | A lecture in the lab | CW                |
| 6                    | 6     | Learn the AutoCAD assistant tools                        | Object Snap, View - Zoom, View - Pan                                                                                       | A lecture in the lab | CW                |
| 7                    | 6     | Learn the AutoCAD Modifying commands                     | Modify tools: Offset, Rectangular and Polar Array                                                                          | A lecture in the lab | CW & HW           |
| 8                    | 6     | Learn the AutoCAD Modifying commands (Continued)         | Modify tools: Stretch, Trim, Extend                                                                                        | A lecture in the lab | CW                |
| 9                    | 6     | Learn the AutoCAD drawing commands                       | Drawing Commands: Point, Divide, Hatch                                                                                     | A lecture in the lab | CW                |

|    |   |                                                |                                                                               |                      |           |
|----|---|------------------------------------------------|-------------------------------------------------------------------------------|----------------------|-----------|
| 10 | 6 | Learn the AutoCAD drawing commands (Continued) | Drawing Commands: Text, Mtext                                                 | A lecture in the lab | CW & HW   |
| 11 | 6 | Learn the AutoCAD Modifying commands           | Modify tools: Chamfer, Fillet, Explode                                        | A lecture in the lab | CW        |
| 12 | 6 | Learning to use layers & drawing property      | Layers and drawing element settings: Color, Linetype, Line Weight, Text Style | A lecture in the lab | CW & Exam |
| 13 | 6 | Learning to use dimensions                     | Dimensions and measurements                                                   | A lecture in the lab | CW        |
| 14 | 6 | Learning how to print drawings                 | Printing and output                                                           | A lecture in the lab | CW        |
| 15 | 6 | Learning the basic of three dimension drawing  | Basics of 3D Drawings                                                         | A lecture in the lab | CW        |

### 11. Course Evaluation

| Evaluation type     | Degree |
|---------------------|--------|
| 2 quizzes           | 10     |
| 2 homework          | 10     |
| Report              | 10     |
| Continues classwork | 10     |
| Term exam           | 10     |
| Final exam          | 50     |
| Total               | 100    |

### 12. Learning and Teaching Resources

|                                                                    |                                                                                                                     |
|--------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|
| Required textbooks (curricular books, if any)                      |                                                                                                                     |
| Main references (sources)                                          |                                                                                                                     |
| Recommended books and references (scientific journals, reports...) | Al-Allaf, Emad Hani, Architectural and Computer Aided Engineering Drawing, 2D Drawing Principles in AutoCAD®, 2018. |
| Electronic References, Websites                                    | <a href="https://www.mycadsite.com">https://www.mycadsite.com</a>                                                   |

## Course Description Form

|                 |
|-----------------|
| 1. Course Name: |
| Statistics      |
| 2. Course Code: |

DWRE124

3. Semester / Year:

2/2025–2026

4. Description Preparation Date:

1/9/2025

5. Available Attendance Forms:

Theoretical lectures in class

6. Number of Credit Hours (Total) / Number of Units (Total)

3/4

7. Course administrator's name (mention all, if more than one name)

Name: Dr. Saleh Mohammed Saleh Email: s.zakaria@uomosul.edu.iq

Name: Dr. Muhanad Talal Yousif Email: mohanad\_alsheer @uomosul.edu.iq

8. Course Objectives

**Course Objectives**

The aim of this course is to introduce the students to the field of processes and practices of engineering statistics . Engineering statistics combines engineering and statistics using scientific methods to analyze data. This course will discuss some basic principles of engineering statistics, and introduces students to the fundamental concepts of Nature of statistical data and symbols, Viewing the data, Measures of central tendency, Measures of the mean, dispersion, and range. The average deviation, variance, coefficient of variation, binomial distribution, normal distribution, Principles of probability theory and hypothesis testing approach, Which is one of the most important topics in the field of making a decision to accept or reject the statistical hypothesis In addition to deal with the details of some statistical tests which include Chi square test, T-test and F-test, in addition to the Regression and correlation, the drawing method, the least squares method, the linear correlation.

At the end of the course, students will have the necessary knowledge to conduct statistical analysis using statistical tests, determine the extent of data correlation, and have the ability to make a decision to accept or reject a statistical hypothesis, , and have the skills of analytical skills (analyze data collected in the field and examine the results) and Communication skills (prepare detailed reports that document their research methods and findings). This will be achieved through descriptive lectures with Preparing engineering statistics reporting and supervised tutorials.

9. Teaching and Learning Strategies

**Strategy**

The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises in addition lectures, individual & group assignments, and e-learning platforms, while at the same time refining and expanding their critical thinking skills.

Exercises involving the use of statistical vocabulary and components to understand the engineering statistical processes. The course will be taught in Arabic , and all mandatory assignments have to be submitted within the deadlines to be admitted to the exams.

This will be achieved through classes, interactive tutorials and by considering some challenging problems to motivate student

10. Course Structure

| Week | Hours | Required Learning Outcomes                                                        | Unit or subject name                                                   | Learning method               | Evaluation method |
|------|-------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------|-------------------------------|-------------------|
| 1    | 3     | Knowing the types and Nature of statistical data and symbols                      | Introduction, Nature of statistical data and symbols,                  | Theoretical lecture in class  | HW                |
| 2    | 3     | data analysis using table and drawing methods                                     | Viewing the data, the table method, the drawing method.                | Theoretical lecture in class  | HW                |
| 3    | 3     | Measures of central tendency and Knowing arithmetic mean, median, and mode        | Measures of central tendency, the arithmetic mean, median, and mode    | Theoretical lectures in class | Exam              |
| 4    | 3     | Measures of the mean, dispersion, and range                                       | Measures of the mean, dispersion, and range                            | Theoretical lectures in class | HW                |
| 5    | 3     | Determination: average deviation, variance, coefficient of variation              | The average deviation, variance, coefficient of variation              | Theoretical lectures in class | Quizzes & HW      |
| 6    | 3     | Knowing the Principles of probability theory                                      | Principles of probability theory                                       | Theoretical lectures in class | HW                |
| 7    | 3     | Knowing the conditional probability                                               | conditional probability.                                               | Theoretical lectures in class | Midterm Exam      |
| 8    | 3     | Analysis Statistical problems using Binomial distribution                         | Binomial distribution                                                  | Theoretical lectures in class | Assignment        |
| 9    | 3     | Analysis Statistical problems using normal distribution                           | normal distribution.                                                   | Theoretical lectures in class | HW                |
| 10   | 3     | Knowing the Hypothesis testing approach                                           | Hypothesis testing approach.                                           | Theoretical lectures in class | online Assignment |
| 11   | 3     | Analysis Statistical problems using Z- test                                       | Statistical tests , Z- test.                                           | Theoretical lectures in class | HW                |
| 12   | 3     | Analysis Statistical problems using Chi square - test.                            | Chi square test .                                                      | Theoretical lectures in class | Report            |
| 13   | 3     | Analysis Statistical problems using F-test .                                      | F-test .                                                               | Theoretical lectures in class | HW                |
| 14   | 3     | Analysis Statistical problems using Regression and correlation                    | Regression and correlation .                                           | Theoretical lectures in class | HW                |
| 15   | 3     | Analysis Statistical problems using least squares method , the linear correlation | the drawing method, the least squares method , the linear correlation. | Theoretical lectures in class | HM                |

## 11. Course Evaluation

| Evaluation type               | Degree |
|-------------------------------|--------|
| Quizzes                       | 10     |
| Assignment (HW) (each 1 pt)   | 10     |
| online Assignment (classwork) | 5      |
| Report                        | 10     |
| Midterm Exam                  | 15     |

|                                                                    |                                                                                                                                                                                         |
|--------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Final Exam                                                         | 50                                                                                                                                                                                      |
| Total                                                              | 100                                                                                                                                                                                     |
| <b>12. Learning and Teaching Resources</b>                         |                                                                                                                                                                                         |
| Required textbooks (curricular books, if any)                      | <ul style="list-style-type: none"> <li>Introduction to Statistics, Dr. Khasha Mahmoud Al-Rawi, College of Agriculture and Forestry, University of Mosul, 2nd Edition, 2000..</li> </ul> |
| Main references (sources)                                          | <ul style="list-style-type: none"> <li>An Introduction to the Science of Statistics: From Theory to Implementation, Preliminary Edition, Joseph C. Watkins</li> </ul>                   |
| Recommended books and references (scientific journals, reports...) | -----                                                                                                                                                                                   |
| Electronic References, Websites                                    | -----                                                                                                                                                                                   |

### Course Description Form

|                                                                           |                                                                                                                                                                                                                                                                                                                                                   |
|---------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Course Name:                                                           |                                                                                                                                                                                                                                                                                                                                                   |
| Chemistry                                                                 |                                                                                                                                                                                                                                                                                                                                                   |
| 2. Course Code:                                                           |                                                                                                                                                                                                                                                                                                                                                   |
| DWRE 125                                                                  |                                                                                                                                                                                                                                                                                                                                                   |
| 3. Semester / Year:                                                       |                                                                                                                                                                                                                                                                                                                                                   |
| 2/2025-2026                                                               |                                                                                                                                                                                                                                                                                                                                                   |
| 4. Description Preparation Date:                                          |                                                                                                                                                                                                                                                                                                                                                   |
| 1/9/2025                                                                  |                                                                                                                                                                                                                                                                                                                                                   |
| 5. Available Attendance Forms:                                            |                                                                                                                                                                                                                                                                                                                                                   |
| Theoretical lectures in class and labrotory                               |                                                                                                                                                                                                                                                                                                                                                   |
| 6. Number of Credit Hours (Total) / Number of Units (Total)               |                                                                                                                                                                                                                                                                                                                                                   |
| 3/3                                                                       |                                                                                                                                                                                                                                                                                                                                                   |
| 7. Course administrator's name (mention all, if more than one name)       |                                                                                                                                                                                                                                                                                                                                                   |
| Name: Dr. Omar Muqdad Abdulgany      Email: O.agha@uomosul.edu.iq         |                                                                                                                                                                                                                                                                                                                                                   |
| Name: alaa ismaeil naser      Email: alaa @uomosul.edu.iq                 |                                                                                                                                                                                                                                                                                                                                                   |
| Name:arwa abd alrazzaq jamal.      Email: arwa.abdalrazzaq@uomosul.edu.iq |                                                                                                                                                                                                                                                                                                                                                   |
| 8. Course Objectives                                                      |                                                                                                                                                                                                                                                                                                                                                   |
| Course Objectives                                                         | <p>The aims of this topic</p> <ol style="list-style-type: none"> <li>1. To gain an understanding of the environment and the different types of environmental pollution.</li> <li>2. To understand the quantitative and qualitative distribution of water in the world and the hydrological cycle of water from a quantity perspective.</li> </ol> |

|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|--|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p>3. To learn about the properties of water sources and how they can become polluted.</p> <p>4. To understand the impact of engineering projects on water quality and self-purification.</p> <p>5. To study the effect of decomposition rate (decomposition constant) on the amount of oxygen required in the process of waste decomposition.</p> <p>6. To analyze the effect of the quality and quantity of wastewater entering and leaving a lake.</p> <p>7. To study the deficit of oxygen in the water and the processes of reaeration and deoxygenation.</p> <p>8. To investigate the effect of wastewater on rivers and the different types of pollution that can occur.</p> <p>9. To understand the impact of detergents on water pollution.</p> <p>10. To study the different types of pollution that can affect rivers and their ecosystems.</p> |
|--|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

#### 9. Teaching and Learning Strategies

|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Strategy</b> | <p>To ensure effective learning of water quality and pollution, the teaching strategies employed should be engaging and equip students with the relevant knowledge and skills. This can be achieved through problem-solving exercises, case studies, and fieldwork. Collaborative learning in groups promotes teamwork, communication, and critical thinking skills. Regular feedback and reflection help students identify areas for improvement and consolidate their learning. Case studies are also useful in illustrating the impact of water pollution on different environments and ecosystems and emphasize the importance of protecting water resources. By utilizing these strategies, students can gain a deeper understanding of water quality and pollution, and develop the skills necessary to become effective professionals in this field.</p> |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

#### 10. Course Structure

| Week | Hours | Required Learning Outcomes                          | Unit or subject name                                                                           | Learning method                     | Evaluation method |
|------|-------|-----------------------------------------------------|------------------------------------------------------------------------------------------------|-------------------------------------|-------------------|
| 1    | 3     | Understand what the water cycle in nature means (i) | Introduction to Environment<br>Lab 1: Solids, Dissolved and Suspended solids, and total solids | Theoretical lectures and laboratory |                   |

|     |   |                                                                                                                                                                                                                               |                                                                                                                                                                             |                                    |                                          |
|-----|---|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|------------------------------------------|
| 2   | 3 | Understand what the water cycle in nature means (i)                                                                                                                                                                           | Hydrological Cycle of water from quantity sides.<br>Lab 1: Solids, Dissolved and Suspended solids, and total solids                                                         | Theoretical lectures and labrotory | H.W + practical experience report        |
| 3   | 3 | Identify the main sources of water pollution and the different types of pollutants. (i)<br>Knowing the limits at which water is classified as suitable for drinking or not (iii)                                              | Properties of water sources, how water sources polluted.<br>Lab 2: Turbidity                                                                                                | Theoretical lectures and labrotory | practical experience report              |
| 4   | 3 | Project management and solutions (iii)                                                                                                                                                                                        | Effect of engineering project on water quality and self-purification.<br>Lab 2: Turbidity                                                                                   | Theoretical lectures and labrotory | practical experience report              |
| 5-6 | 3 | Identify the reasons for non-organic decomposition and organic decomposition with oxygen and calculate the decomposition constant (i)<br>The student learns to use pH meters and know the acidity and basicity of water (iii) | Effect of decomposition rate (decomposition constant) on the amount of oxygen required in the process of waste decomposition<br>Lab 3: PH-value<br>Electrical Conductivity. | Theoretical lectures and labrotory | Daily exam + practical experience report |

|    |   |                                                                                                                                                                                                                                    |                                                                                                                           |                                    |                                           |
|----|---|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|------------------------------------|-------------------------------------------|
| 7  | 3 | To be able to calculate changes in dissolved oxygen, anoxia, and biological oxygen demand (BoD) along a river course due to wastewater. (iii)                                                                                      | Calculate the change of dissolved oxygen along the riverbed due to wastewater. Lab 3: PH-value & Electrical Conductivity. | Theoretical lectures and labrotory | practical experience report               |
| 8  | 3 |                                                                                                                                                                                                                                    | Mid-term Exam<br>Lab 4: Electrical onductivity                                                                            | Theoretical lectures and labrotory | Monthly exam                              |
| 9  | 3 | To be able to calculate changes in dissolved oxygen, anoxia, and biological oxygen demand (BoD) along a river course due to wastewater. (iii)<br>Knowing the salt concentration of water through a salinity measuring device (iii) | Calculate the change of deficit oxygen along the riverbed due to wastewater. Lab 4: Electrical Conductivity               | Theoretical lectures and labrotory | practical experience report               |
| 10 | 3 | To be able to calculate changes in dissolved oxygen, anoxia, and biological oxygen demand (BoD) along a river course due to wastewater. (iii)                                                                                      | Calculate the change of BoD along the riverbed due to wastewater<br>Lab 5: Hardness                                       | Theoretical lectures and labrotory | Daily exam<br>Practical experience report |

|       |   |                                                                                                                                                                                        |                                                                                                            |                                    |                                    |
|-------|---|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|------------------------------------|------------------------------------|
| 11-12 | 3 | Be able to calculate the impact of the quality and quantity of wastewater entering and leaving the lake.(i)<br>Learn water hardness limits and calcium and sodium concentrations (iii) | Effect of the quality and quantity of wastewater entering and leaving the lake.<br>Lab 5: Hardness         | Theoretical lectures and labrotory | H.W<br>Practical experience report |
| 13    | 3 | Be able to calculate the impact of the quality and quantity of wastewater entering and leaving the lake.(i)                                                                            | Seasonal inversion in lakes, Effect of detergents on the pollution of the water<br>Lab 6: Dissolved Oxygen | Theoretical lectures and labrotory | Practical experience report        |
| 14    | 3 | Gain experience and understand the types of pollution and ways to treat them (iii)<br>Knowing the extent of the effect of low oxygen on aquatic organisms (iii)                        | Study the type of pollution on the river.<br>Lab 6: Dissolved Oxygen                                       | Theoretical lectures and labrotory | Practical experience report        |
| 15    | 3 | Identifying the causes of pollution and finding appropriate solutions to solve the                                                                                                     | Wastewater treatment.                                                                                      | Theoretical lectures and labrotory | Practical experience report        |

|    |   |                                        |  |  |  |
|----|---|----------------------------------------|--|--|--|
|    |   | pollution problem (iii)                |  |  |  |
| 16 | 3 | Preparatory week before the final Exam |  |  |  |

### 11. Course Evaluation

| Evaluation type     | Degree |
|---------------------|--------|
| quizzes 2           | 10     |
| Homework 2          | 10     |
| Report 1            | 5      |
| Project labrotory 1 | 15     |
| Term exam           | 10     |
| Final exam          | 50     |
| Total               | 100    |

### 12. Learning and Teaching Resources

|                                                                    |                                                                                                                                                                      |
|--------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Required textbooks (curricular books, if any)                      | <ul style="list-style-type: none"> <li>د. طارق احمد محمود " علم و تكنولوجيا البيئة "</li> <li>كتاب منهجي لمادة هندسة البيئة - جامعة الموصل -كلية الهندسة.</li> </ul> |
| Main references (sources)                                          | <ul style="list-style-type: none"> <li></li> </ul>                                                                                                                   |
| Recommended books and references (scientific journals, reports...) | -----                                                                                                                                                                |
| Electronic References, Websites                                    | -----                                                                                                                                                                |

## Course Description Form

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                               |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Course Name:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                               |
| Human Rights and Democracy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                               |
| 2. Course Code:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                               |
| UOM 1040                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                               |
| 3. Semester / Year:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                               |
| /2/ 2025-2026                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                               |
| 4. Description Preparation Date:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                               |
| 1/9/2025                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                               |
| 5. Available Attendance Forms:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                               |
| My presence                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                               |
| 6. Number of Credit Hours (Total) / Number of Units (Total)                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                               |
| 2/2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                               |
| 7. Course administrator's name (mention all, if more than one name)                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                               |
| Name: sarah ahmed hamad<br>Sarah_law <a href="mailto:Sarah_law@uomosul.edu.iq">@uomosul.edu.iq</a>                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                               |
| 8. Course Objectives                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                               |
| <ul style="list-style-type: none"> <li>-Understanding, knowing, and realizing the rights that God Almighty has granted to all human beings. They are a gift, not a gain for anyone, and no one has the right to take them away.</li> <li>- The student expresses and defends these rights in his own way</li> <li>- Explaining phenomena and giving explanations for the violations of rights that occur before him</li> <li>- Identifying deficiencies and gaps in light of the information available in the course</li> </ul> |                                                                                                                                                                                                                               |
| 9. Teaching and Learning Strategies                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                               |
| Strategy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <ul style="list-style-type: none"> <li>- In-person education, through which the following teaching methods were used:</li> <li>- lecture</li> <li>- Discussion</li> <li>- Brainstorming</li> <li>- Problem Solving</li> </ul> |

- Assigning the student to prepare a report
- In addition to e-learning support, which was done through classroom
  - Homework
  -

#### 10. Course Structure

| Evaluation method | Learning method      | Name of the unit or topic                                    | Required learning outcomes                                                        | hours | week |
|-------------------|----------------------|--------------------------------------------------------------|-----------------------------------------------------------------------------------|-------|------|
|                   | Theoretical leacture | Introduction/The concept of human rights                     | The student should know an introduction to rights(v)                              | 2     | 1    |
|                   | Theoretical leacture | Definition of right                                          | The student must know the correct language and terminology (v)                    | 2     | 2    |
|                   | Theoretical leacture | Definition of human                                          | The student should know the definition of a human being(v)                        | 2     | 3    |
| Daily exam + H.W  | Theoretical leacture | Legal personality and its features                           | That the student understands the concept of legal personality and its feature(iv) | 2     | 4    |
|                   | Theoretical leacture | Historical development of the concept of rights and freedoms | The student should enumerate the historical development of rights and freedoms(v) | 2     | 5    |
|                   | Theoretical leacture | Rights and freedoms in Eastern civilizations                 | The student should know Eastern civilizations(iv)                                 | 2     | 6    |
|                   | Theoretical leacture | Rights and freedoms in Eastern civilizations                 | The student should know                                                           | 2     | 7    |

|            |                      |                                                                      |                                                                                  |   |    |
|------------|----------------------|----------------------------------------------------------------------|----------------------------------------------------------------------------------|---|----|
|            |                      |                                                                      | Western civilizations(v)                                                         |   |    |
| Mid exam   | Theoretical leacture | The historical development of the idea of rights in the ages         | The student should know the rights of the ages(v)                                | 2 | 8  |
|            | Theoretical leacture | Rights and freedoms in heavenly laws                                 | The student should enumerate the heavenly laws(v)                                | 2 | 9  |
|            | Theoretical leacture | Rights and freedoms in the Christian religion                        | The student should know the rights in the Christian religion(v)                  | 2 | 10 |
| Daily exam | Theoretical leacture | Rights and freedoms in the Islamic religion                          | That the student understands the rights and freedoms in the Islamic religion(iv) | 2 | 11 |
| H.W        | Theoretical leacture | Development in the concept of human rights throughout the modern era | To talk about human rights throughout the modern era(v)                          | 2 | 12 |
|            | Theoretical leacture | Review and discuss                                                   |                                                                                  | 2 | 13 |
|            | Theoretical leacture | Modern trends in rights and freedoms                                 | The student should enumerate modern trends rights and freedom (v)                | 2 | 14 |
| Discuse    | Theoretical leacture | Discusse report                                                      |                                                                                  | 2 | 15 |

### 11.Course Evaluation

very good

### 12.Learning and Teaching Resources

| Evaluation type | Degree |
|-----------------|--------|
| 2 quizzes(2)    | 20     |
| Report(1)       | 10     |
| H.w(2)          | 10     |

|                                                                    |                                                                                                                                       |
|--------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|
| Mid exam 1                                                         | 10                                                                                                                                    |
| Final exam                                                         | 50                                                                                                                                    |
| Total                                                              | 100                                                                                                                                   |
|                                                                    |                                                                                                                                       |
| Required textbooks (curriculum books, if any)                      | computer                                                                                                                              |
| Main references (sources)                                          | Curriculum                                                                                                                            |
| Recommended books and references (scientific journals, reports...) | <a href="https://classroom.google.com/c/NjM4NDkzMTgyNjk4?cjc=dlbklgw">https://classroom.google.com/c/NjM4NDkzMTgyNjk4?cjc=dlbklgw</a> |
| Electronic References, Websites                                    | Google scholar<br>Youtube                                                                                                             |

## Course Description Form

| 1. Course Name:                                                     |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                     |                              |                   |
|---------------------------------------------------------------------|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|------------------------------|-------------------|
| English I                                                           |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                     |                              |                   |
| 2. Course Code:                                                     |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                     |                              |                   |
| UOM 1021                                                            |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                     |                              |                   |
| 3. Semester / Year:                                                 |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                     |                              |                   |
| 2/2025–2026                                                         |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                     |                              |                   |
| 4. Description Preparation Date:                                    |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                     |                              |                   |
| 1/9/2025                                                            |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                     |                              |                   |
| 5. Available Attendance Forms:                                      |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                     |                              |                   |
| Theoretical lectures in class                                       |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                     |                              |                   |
| 6. Number of Credit Hours (Total) / Number of Units (Total)         |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                     |                              |                   |
| 2/2                                                                 |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                     |                              |                   |
| 7. Course administrator's name (mention all, if more than one name) |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                     |                              |                   |
| Name: Dr. Saleh Mohammed Saleh Email: s.zakaria@uomosul.edu.iq      |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                     |                              |                   |
| 8. Course Objectives                                                |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                     |                              |                   |
| Course Objectives                                                   |       | <ol style="list-style-type: none"> <li>1. The main objective of this course is to emphasize the fundamental language skills of reading, writing, speaking, listening, thinking, viewing, and presenting.</li> <li>2. The course includes studies of various literary genres: short story, novel, and non-fiction.</li> <li>3. The course also helps students to improve their English language grammar and reading abilities, and becoming more effective use of grammar and natural self-expression in English.</li> </ol> |                                                                                                                                     |                              |                   |
| 9. Teaching and Learning Strategies                                 |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                     |                              |                   |
| Strategy                                                            |       | The primary strategy for delivering this module will be to encourage students to participate in the exercises while refining and expanding their critical thinking skills. This will be accomplished through classes, interactive tutorials, and the consideration of simple experiments involving sampling activities that students find interesting.                                                                                                                                                                      |                                                                                                                                     |                              |                   |
| 10. Course Structure                                                |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                     |                              |                   |
| Week                                                                | Hours | Required Learning Outcomes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Unit or subject name                                                                                                                | Learning method              | Evaluation method |
| 1                                                                   | 2     | The students will attain and enhance competence in the four modes of literacy: writing, speaking, reading and listening.                                                                                                                                                                                                                                                                                                                                                                                                    | Unit 1 : A world of difference: Tenses * Auxiliary verbs * What's in a word? Everyday situations                                    | Theoretical lecture in class | HW                |
| 2                                                                   | 2     | Students will heighten their awareness of correct usage of English grammar in writing and speaking.                                                                                                                                                                                                                                                                                                                                                                                                                         | Starter : Tenses and auxiliary verbs, Each question has one word missing. Write it in, T 1.1 Listen and check your answers, GRAMMAR | Theoretical lecture in class | HW                |

|   |   |                                                                                                         |                                                                                                                                                                                                                                                                                      |                               |              |
|---|---|---------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|--------------|
|   |   |                                                                                                         | SPOT, Write your own quiz,                                                                                                                                                                                                                                                           |                               |              |
| 3 | 2 | Students will improve their speaking ability in English both in terms of fluency and comprehensibility. | PRACTICE You're so wrong!, T 1.2 Listen and check, s=is or has?, T 1.3 Listen to some more sentences with 3, Talking about you, MAKING CONVERSATION, Short answers                                                                                                                   | Theoretical lectures in class | HW           |
| 4 | 2 | Students will give oral presentations and receive feedback on their performance.                        | T 1.4 Ruth is collecting her children, SPOKEN ENGLISH Sounding polite, PRACTICE 1 Match a line in A with a short answer in B and a line in C., T 1.6 Listen and check. Practise with a partner. Pay attention to stress and intonation, class survey, Check it                       | Theoretical lectures in class | HW & Quizzes |
| 5 | 2 | Students will increase their reading speed.                                                             | READING AND SPEAKING Worlds apart, Discuss these questions about your family, The Kamaus from Kenya, The Qus from Beijing, China, LISTENING AND SPEAKING A world in one family, T 1.7 Listen to Xabier talking about his family, T 1.8 Listen to Xabier's mother, What do you think? | Theoretical lectures in class | Monthly Exam |
| 6 | 2 | Students will improve their reading fluency skills through extensive reading.                           | Unit 2 : The working week Present tenses « Passive * Free time activities * Making small talk, Starter : MY FAVOURITE DAY OF THE WEEK Present tenses — states and activities , T 2.2 Listen to them talking about their favourite day of the week. What is it? Why?                  | Theoretical lectures in class | HW           |
| 7 | 2 | Students will enlarge their vocabulary.                                                                 | GRAMMAR SPOT, PRACTICE Questions and answers, T 2.3 Listen and check, T 2.4 Listen and check, Talking about you, Dave Telford police officer and surfer                                                                                                                              | Theoretical lectures in class | HW           |
| 8 | 2 | the students will attain and enhance competence in the four modes of literacy: writing,                 | Simple and continuous T 2.5 Listen to two people talking about who's who in The Office. What are their names? What are their jobs?, Work with a                                                                                                                                      | Theoretical lectures in class | Midterm Exam |

|    |   |                                                                                                         |                                                                                                                                                                                                                                                                       |                               |              |
|----|---|---------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|--------------|
|    |   | speaking, reading and listening.                                                                        | partner. Read the conversation aloud.                                                                                                                                                                                                                                 |                               |              |
| 9  | 2 | Students will heighten their awareness of correct usage of English grammar in writing and speaking.     | Interview someone you know about his/her job. Tell the class about this person, Activity verbs, Active and passive, STATISTICS ABOUT JOBS AND MONEY IN THE UK, Put the verbs in the present passive, simple or continuous, LISTENING AND SPEAKING Who earns how much? | Theoretical lectures in class | HW & Quizzes |
| 10 | 2 | Students will improve their speaking ability in English both in terms of fluency and comprehensibility. | T 2.6 Listen to Part 1. Answer the questions. T 2.7 Listen to Part 2. Answer the questions, Soken English Giving opinions, READING AND SPEAKING Charles, Prince of Wales, VOCABULARY AND SPEAKING Free time activities                                                | Theoretical lectures in class | HW           |
| 11 | 2 | Students will give oral presentations and receive feedback on their performance.                        | T 2.8 Listen to John talking about his hobby, EVERYDAY ENGLISH Making small talk, T 2.9 Read and listen to the conversation, Spoken English: Softening negative comment, T 2.10 Listen to the questions and answer, T 2.11 Listen and compare.                        | Theoretical lectures in class | Report       |
| 12 | 2 | Students will increase their reading speed.                                                             | Unite 3 : Good times, bad times, past tenses, spelling and pronunciation, Giving opinions, Starter: play the Fortunately, Unfortunately game around the class, VINCENT VAN GOGH,                                                                                      | Theoretical lectures in class | Quizzes      |
| 13 | 2 | Students will improve their reading fluency skills through extensive reading.                           | Past tenses and used to, inent Van Gogh, the genius unrecognized in his own lifetime, GRAMMAR SPOT: In these sentences, which verb form is ...? Past Simple Past Continuous Past Simple passive,                                                                      | Theoretical lectures in class | HW           |
| 14 | 2 | Students will enlarge their vocabulary.                                                                 | Pronunciation, practice , didn't do much, Discussing grammar, A newspaper story,                                                                                                                                                                                      | Theoretical lectures in class | HW           |

|    |   |                                            |                                                                                                                                                                                                                              |                                  |    |
|----|---|--------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|----|
|    |   |                                            | Dictation, SMASH! ,<br>Clumsy visitor destroys<br>priceless vases By Tom<br>Ball, VOCABULARY,<br>Spelling and<br>pronunciation, Words that<br>sound the same, Spelling,<br>Lost sounds, READING,<br>A Shakespearean tragedy, |                                  |    |
| 15 | 2 | English writing practice<br>for beginners. | The first time I fell in<br>love, What do you<br>think? ,VERYDAY<br>ENGLISH, Giving<br>opinions, SPOKEN<br>ENGLISH Making an<br>opinion stronger                                                                             | Theoretical<br>lectures in class | HM |

### 11. Course Evaluation

| Evaluation type             | Degree |
|-----------------------------|--------|
| Quizzes                     | 10     |
| Assignment (HW) (each 1 pt) | 10     |
| Report                      | 10     |
| Monthly Exam                | 10     |
| Midterm Exam                | 10     |
| Final Exam                  | 50     |
| Total                       | 100    |

### 12. Learning and Teaching Resources

|                                                                       |                                                                                                                                                                                         |
|-----------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Required textbooks (curricular books, if any)                         | <ul style="list-style-type: none"> <li>Ronald Carter and Michael McCarthy. Cambridge grammar of English: A comprehensive guide. Cambridge: Cambridge University Press, 2006.</li> </ul> |
| Main references (sources)                                             | <ul style="list-style-type: none"> <li>Rodney Huddleston, Geoffrey K. Pullum. The Cambridge Grammar of the English Language, 2002.</li> </ul>                                           |
| Recommended books and references<br>(scientific journals, reports...) | -----                                                                                                                                                                                   |
| Electronic References, Websites                                       | -----                                                                                                                                                                                   |

## Second Level

Course  
Form

| Level              | Semester | No. | Module Code | Module Name in English | اسم المادة الدراسية | Language | SSWL (hr/w) |   |   |   |   | Exam hr/sem | SSWL hr/sem | USSWL hr/sem | SWL hr/sem | ECTS | Module Type | Prerequisite Module(s) Code |  |
|--------------------|----------|-----|-------------|------------------------|---------------------|----------|-------------|---|---|---|---|-------------|-------------|--------------|------------|------|-------------|-----------------------------|--|
| 3                  |          | 1   | DWRE 211    | Mathematics III        | الرياضيات III       | English  | 2           |   |   |   | 2 |             | 3           | 63           | 62         | 125  | 5.00        | B                           |  |
|                    |          | 2   | DWRE 212    | Fluid Mechanics I      | ميكانيك الموائع I   | English  | 2           |   | 2 |   | 2 |             | 3           | 93           | 57         | 150  | 6.00        | C                           |  |
|                    |          | 3   | DWRE 213    | Strength of Materials  | مقاومة المواد       | English  | 2           | 1 |   |   | 2 |             | 3           | 78           | 72         | 150  | 6.00        | B                           |  |
|                    |          | 4   | DWRE 214    | Surveying              | المساحة             | English  | 2           |   | 2 |   | 1 |             | 3           | 78           | 22         | 100  | 4.00        | C                           |  |
|                    |          | 5   | UOM 2032    | Computer II            | حاسوب II            | English  | 1           |   |   | 2 |   |             | 3           | 48           | 27         | 75   | 3.00        | B                           |  |
|                    |          | 6   | DWRE 216    | Building Construction  | انشاء المباني       | Arabic   | 2           |   |   | 2 |   |             | 3           | 63           | 37         | 100  | 4.00        | C                           |  |
|                    |          | 7   | UOM 2012    | Arabic 2               | اللغة العربية 2     | Arabic   | 2           |   |   |   |   |             | 3           | 33           | 17         | 50   | 2.00        | B                           |  |
| Total Weekly Hours |          |     |             |                        |                     |          | 13          | 1 | 8 | 0 | 7 | 0           | 21          | 423          | 294        | 750  | 30.00       |                             |  |
| UGII               |          |     |             |                        |                     | 29       |             |   |   |   |   |             |             |              |            |      |             |                             |  |
|                    |          |     |             |                        |                     |          |             |   |   |   |   |             |             |              |            |      |             |                             |  |
|                    |          |     |             |                        |                     |          |             |   |   |   |   |             |             |              |            |      |             |                             |  |
|                    |          |     |             |                        |                     |          |             |   |   |   |   |             |             |              |            |      |             |                             |  |
|                    |          |     |             |                        |                     |          |             |   |   |   |   |             |             |              |            |      |             |                             |  |
|                    |          |     |             |                        |                     |          |             |   |   |   |   |             |             |              |            |      |             |                             |  |
|                    |          |     |             |                        |                     |          |             |   |   |   |   |             |             |              |            |      |             |                             |  |
| 4                  |          |     |             |                        |                     | 29       |             |   |   |   |   |             |             |              |            |      |             |                             |  |
|                    |          |     |             |                        |                     |          |             |   |   |   |   |             |             |              |            |      |             |                             |  |
|                    |          |     |             |                        |                     |          |             |   |   |   |   |             |             |              |            |      |             |                             |  |
|                    |          |     |             |                        |                     |          |             |   |   |   |   |             |             |              |            |      |             |                             |  |
|                    |          |     |             |                        |                     |          |             |   |   |   |   |             |             |              |            |      |             |                             |  |
|                    |          |     |             |                        |                     |          |             |   |   |   |   |             |             |              |            |      |             |                             |  |
|                    |          |     |             |                        |                     |          |             |   |   |   |   |             |             |              |            |      |             |                             |  |
| Total Weekly Hours |          |     |             |                        |                     |          | 15          | 1 | 6 | 0 | 7 | 0           | 21          | 456          | 294        | 750  | 30.00       |                             |  |
| Total Weekly Hours |          |     |             |                        |                     |          | 29          |   |   |   |   |             |             |              |            |      |             |                             |  |

Description

|                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Course Name:                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Mathematics III                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 2. Course Code:                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| DWRE 211                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 3. Semester / Year:                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| First/ 2025-2026                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 4. Description Preparation Date:                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 1/9/2025                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 5. Available Attendance Forms:                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Theoretical lectures in class.                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 6. Number of Credit Hours (Total) / Number of Units (Total)             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 4/2                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 7. Course administrator's name (mention all, if more than one name)     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Name: Dr. Muhanad Talal Yousif<br>Email: mohanad_alsheer@uomosul.edu.iq |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 8. Course Objectives                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Course Objectives                                                       | <ul style="list-style-type: none"> <li>o Understanding of the fundamental concepts of polar coordinates system (i)</li> <li>o Used polar coordinates system to calculate the area and curve length (ii)</li> <li>o Define vector and unite vector (i)</li> <li>o Apply the principle of scalar and vector products to solve some problems (ii)</li> <li>o Using vector approach to find plane equation and line equation (ii)</li> <li>o Using vector approach to find the angle between plane (ii)</li> </ul> |
| 9. Teaching and Learning Strategies                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Strategy                                                                | Power point presentation and multimedia tools are used in classrooms; Examples and problems will be solved and                                                                                                                                                                                                                                                                                                                                                                                                 |

|  |                                                                                                                                                                                                                                                                                      |
|--|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p>illustrated on the classroom board; Tutorials are also organized to establish a closer contact with students.</p> <p>The course objects demonstrate sequence in mathematics III primarily for students intending to major in a field of dams and water resources engineering.</p> |
|--|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

#### 10. Course Structure

| Week  | Hours | Required Learning Outcomes                                               | Unit or subject name                                                                                                                  | Learning method    | Evaluation method |
|-------|-------|--------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|--------------------|-------------------|
| 1-3   | 12    | Understanding of the fundamental concepts of polar coordinates system    | Introduction to polar coordinate system and Symmetry of polar coordinate graphs                                                       | A lecture in class | H.W, C.W and Exam |
| 4-6   | 12    | Used polar coordinates system to calculate the area and curve length     | area and length in polar coordinate system                                                                                            | A lecture in class | H.W, C.W and Exam |
| 7-9   | 8     | Define vector                                                            | Vector component and the length of vector, vector in space                                                                            | A lecture in class | H.W, C.W and Exam |
| 10-12 | 12    | Apply the principle of scalar and vector products to solve some problems | Product of two vectors (The scalar product), Vector projections; Orthogonal vectors                                                   | A lecture in class | H.W, C.W and Exam |
| 13-15 | 12    | Apply the principle of scalar and vector products to solve some problems | Lines in the plane and distance from points, The cross products (vector product), Equation of lines and planes, Angles between planes | A lecture in class | H.W, C.W and Exam |

#### 11. Course Evaluation

|                        |               |
|------------------------|---------------|
| <b>Evaluation type</b> | <b>Degree</b> |
|------------------------|---------------|

|                                                                    |                                                                                                       |
|--------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|
| 3 Exam                                                             | 30                                                                                                    |
| 3 homework                                                         | 6                                                                                                     |
| 2 classwork                                                        | 4                                                                                                     |
| Final exam                                                         | 60                                                                                                    |
| Total                                                              | 100                                                                                                   |
| <b>12. Learning and Teaching Resources</b>                         |                                                                                                       |
| Required textbooks (curricular books, if any)                      | “Calculus”. Ross L Finney and George B. Thomas. Copyright by Addison Wesley Publishing Company, 1990. |
| Main references (sources)                                          | “THOMAS CALCULUS” George B. Thomas. Printed in the United States of America., 2014.                   |
| Recommended books and references (scientific journals, reports...) | _____                                                                                                 |
| Electronic References, Websites                                    | _____                                                                                                 |

### Course Description Form

|                                                                            |
|----------------------------------------------------------------------------|
| <b>1. Course Name:</b>                                                     |
| Fluid Mechanics 1                                                          |
| <b>2. Course Code:</b>                                                     |
| DWRE 212                                                                   |
| <b>3. Semester / Year:</b>                                                 |
| First 2025–2026                                                            |
| <b>4. Description Preparation Date:</b>                                    |
| 1/9/2025                                                                   |
| <b>5. Available Attendance Forms:</b>                                      |
| Lectures and Tutorials                                                     |
| <b>6. Number of Credit Hours (Total) / Number of Units (Total)</b>         |
| 6hr/6 credits                                                              |
| <b>7. Course administrator's name (mention all, if more than one name)</b> |
| Name: Azza Nasralla Jarall Al-talib Email: a.altalib@uomosul.edu.iq        |

## 8. Course Objectives

|                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Course Objectives</b> | The fluid mechanics is the basic subject for second-stage students in the dams and water resources engineering department that from this subject student will learn and practice to find properties (units and dimensions, Density, Specific weight, Viscosity, Surface tension, Capillarity). Fluid static (pressure–density–height relationships). Absolute pressure and gauge pressure, types of pressure gages. Force on submerged plane surfaces. Force on submerged curved surfaces. Applied problem about gates, dams .....etc. Stability of submerged floating bodies. This achieved by theoretical lectures. |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## 9. Teaching and Learning Strategies

|                 |                                                                                                                                                                                   |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Strategy</b> | The strategy is to provide theoretical lectures using presentation and question solving in an interactive way with students inside the classroom, as well as tutorials exercises. |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## 10. Course Structure

| Week | Hours | Required Learning Outcomes                                         | Unit or subject name                                                 | Learning method              | Evaluation method |
|------|-------|--------------------------------------------------------------------|----------------------------------------------------------------------|------------------------------|-------------------|
| 1    | 2     | Introduction                                                       | Introduction                                                         | Presentation And white board | Monthly exam      |
| 2    | 2     | Fluid properties – Units and Dimensions, Density, Specific weight, | Fluid properties – Units and Dimensions, Density, Specific weight,   | Presentation And white board | Monthly exam      |
| 3    | 2     | Compressibility, Elasticity. Surface tension, Capillarity          | Compressibility, Elasticity. Viscosity, Surface tension, Capillarity | Presentation And white board | Monthly exam      |
| 4&5  | 4     | Fluid static (pressure–density relationships).                     | Fluid static (pressure–density–height relationships).                | Presentation And white board | Monthly exam      |
| 6    | 2     | Fluid static (pressure–density relationships).                     | Fluid static (pressure–density–height relationships)                 | Presentation And white board | Monthly Exam      |
| 7    | 2     | exam                                                               |                                                                      |                              |                   |
| 8&9  | 4     | Absolute pressure and gauge types of pressure gages                | Absolute pressure and gauge types of pressure gages                  | Presentation And white board | Monthly Exam      |
| 10   | 2     | Force on submerged plane surfaces                                  | Force on submerged plane surfaces.                                   | white board                  | Monthly Exam      |
| 11   | 2     | Stability of submerged and floating bodies.                        | Stability of submerged and floating bodies.                          | white board                  | Monthly Exam      |
| 12   | 2     | Applied problem about gates .....etc.                              | Applied problem about gates .....etc.                                | white board                  | Monthly Exam      |
| 13   | 2     | Applied problems on submerged and floating bodies                  | Applied problems on submerged and floating bodies                    | white board                  | Monthly Exam      |
| 14   | 2     | exam                                                               |                                                                      |                              |                   |
| 15   | 2     | Preparatory week before the final Exam                             |                                                                      |                              |                   |

### Laboratory Experiments:

| Week     | Hours | Required Learning Outcomes             | Unit or subject name                         | Learning method        | Evaluation method    |
|----------|-------|----------------------------------------|----------------------------------------------|------------------------|----------------------|
| 1        | 2     | Learn how to write the Report          | Writing report                               | presentation           | Experimental reports |
| 2,3,4    | 6     | Center of Pressure of Immersed Surface | Learn Center of Pressure Immersed Surface    | Laboratory experiments | Experimental Reports |
| 4,6,7    | 6     | Reynolds Number in Pipe                | Reynolds Number in Pipe                      | Laboratory experiments | Experimental reports |
| 8,9,10   | 6     | Forces due to Jet Impact on Plates     | Calculate Forces due to Jet Impact on Plates | Laboratory experiments | Experimental reports |
| 11,12,13 | 6     | Learn Discharge by orifice Meter       | Discharge Measurements by orifice Meter      | Laboratory experiments | Experimental reports |
| 14&15    | 4     | Final lab exam                         |                                              |                        |                      |

### 11. Course Evaluation

| Evaluation type | degree |
|-----------------|--------|
| 2 Quizzes       | 10     |
| 2 h.w.          | 10     |
| lab             | 20     |
| Mid exam        | 10     |
| Final exam      | 50     |
| total           | 100    |

### 12. Learning and Teaching Resources

|                                                                    |                                                                                                         |
|--------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|
| Required textbooks (curricular books, if any)                      | Vennard, J.K., 1963. Elementary fluid mechanics. edition.                                               |
| Main references (sources)                                          | Rajput, R.K., 2004. <i>A textbook of fluid mechanics hydraulic machines</i> . S. Chand Publishing.      |
| Recommended books and references (scientific journals, reports...) |                                                                                                         |
| Electronic References, Websites                                    | <a href="https://uclouvain.be/en-cours-2023-lbres2104">https://uclouvain.be/en-cours-2023-lbres2104</a> |

## Course Description Form

|                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|---------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Course Name:                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Strength of Material                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 2. Course Code:                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| DWRE213                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 3. Semester / Year:                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Fall 2025–2026                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 4. Description Preparation Date:                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| August 15, 2025                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 5. Available Attendance Forms:                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Theoretical lectures in class                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 6. Number of Credit Hours (Total) / Number of Units (Total)         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 6 / 5                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 7. Course administrator's name (mention all, if more than one name) |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Name: Dr. Saddam M. AHMED    Email: ahmed.saddam@uomosul.edu.iq     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 8. Course Objectives                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Course Objectives</b>                                            | <p>In DWRE 213, initially students will learn how to analysis and assess the Internal strength and deformation for systems. Upon successful completion of this course the student shall be able to assess the:</p> <ul style="list-style-type: none"> <li>- Evaluate the mechanical properties of systems.</li> <li>- Analyze axially loaded bars and trusses.</li> <li>- Design axially loaded bars and trusses.</li> <li>- Evaluate shear stresses and design joints and bolts.</li> <li>- Evaluate deformation and stress in cables and analyze indeterminate systems.</li> <li>- Evaluate shear stresses and deformation and design torsional systems.</li> <li>- Evaluate beam mechanical properties, including maximum shear and bending moments.</li> <li>- Analyze behavior of members under bending.</li> <li>- Evaluate stress deformation due to combined loading (force and bending).</li> <li>- Evaluate maximum deformation and slope in systems.</li> <li>- Evaluate principal and maximum in-plane shear stresses using Mohr's circle, and absolute maximum shear stress, plane strain.</li> </ul> |
| 9. Teaching and Learning Strategies                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Strategy</b>                                                     | The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering some challenging problems to motivate students.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

## 10. Course Structure

| Week    | Hours | Required Learning Outcomes | Unit or subject name                                                                                                                | Learning method | Evaluation method |
|---------|-------|----------------------------|-------------------------------------------------------------------------------------------------------------------------------------|-----------------|-------------------|
| 1       | 5     | i                          | Introduction, syllabus, equilibrium conditions of rigid bodies, structural analysis                                                 | Lectures        | Ass 1             |
| 2       | 5     | i                          | Structural analysis, average normal stress in axially loaded beams, stress in simple trusses                                        | Lectures        | HW1               |
| 3       | 5     | i                          | Shear stress, allowable stress, design of simple joints                                                                             | Lectures        | Ass 2             |
| 4       | 5     | i                          | Deformation and stress in cables, analysis of indeterminate structures                                                              | Lectures        | Quiz 1, HW2       |
| 5       | 5     | i                          | Torsional deformation of circular shafts, torsion formula, power transmission, angle of twist                                       | Lectures        | Report1           |
| 6       | 5     | i                          | Shear stress and deformation in beams and shafts due to torsion                                                                     | Lectures        | Ass3              |
| 7 & 8   | 10    | i                          | Shear and bending moment diagrams, graphical method, beam deflection, bending formula, unsymmetrical bending, stress concentrations | Lectures        | Quiz 2, HW3       |
| 9       | 5     |                            | Shear in straight members, shear formula, shear flow in built-up members                                                            | Lectures        | Report 2          |
| 10      | 5     |                            | Stress due to combined loading                                                                                                      | Lectures        | Ass4              |
| 11 & 12 | 10    |                            | Elastic curve, slope and deflection by integration, moment-area method                                                              | Lectures        | HW4               |
| 13      | 5     |                            | Plane stress, general plane stress transformation equations, principal stresses, maximum in-plane shear                             | Lectures        | Ass5              |
| 14      | 5     |                            | Mohr's circle for plane stress, absolute maximum shear stress, Mohr's circle – material composition and quality relationships       | Lectures        | HW5               |

## 11. Course Evaluation

| Evaluation type                               | Degree  |
|-----------------------------------------------|---------|
| Two Quizzes (7 pts each)                      | 14 pts  |
| Midterm Exam                                  | 14 pts  |
| Homework (best 4 out of total, 2 pts each)    | 8 pts   |
| Assignments (best 4 out of total, 2 pts each) | 8 pts   |
| Two Reports (3 pts each)                      | 6 pts   |
| Final Exam                                    | 50 pts  |
| Total                                         | 100 pts |

## 12. Learning and Teaching Resources

|                                               |                                                                                                                                                                          |
|-----------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Required textbooks (curricular books, if any) | R C., HIBBELER (2011) " <a href="#">Mechanics of Materials</a> ", eight Edition, PEARSON, ISBN 13: 978-0-13-602230-5, USA. (can be downloaded from the Course web page). |
|-----------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|                                                                    |                                                                                                                                                       |
|--------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| Main references (sources)                                          | RC., HIBBELER (2011) "Mechanics of Materials", eight Edition, PEARSON, ISBN 13: 978-0-13-602230-5, USA. (can be downloaded from the Course web page). |
| Recommended books and references (scientific journals, reports...) | -----                                                                                                                                                 |
| Electronic References, Websites                                    | -----                                                                                                                                                 |

## Course Description Form

|                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|---------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Course Name:                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Surveying                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 2. Course Code:                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| DWRE 214                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 3. Semester / Year:                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| First/ 2025–2026                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 4. Description Preparation Date:                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 1/9/2025                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 5. Available Attendance Forms:                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Lectures on theory conducted in the classroom.<br>A practical lecture conducted in the laboratory.                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 6. Number of Credit Hours (Total) / Number of Units (Total)                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 10 hours/ 4credits                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 7. Course administrator's name (mention all, if more than one name)                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Name: Dr. Omar Muqdad Abdulgany, Email: o.agma@uomosul.edu.iq<br>Name: Alaa Ismael Nasar, Email: engalaaismail79@uomosul.edu.iq |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 8. Course Objectives                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Course Objectives</b>                                                                                                        | Surveying I aims to teach students how to measure distances through obstacle construction and adjustment of levels, Measurement a long straight line offset, Method locating a point or the types of coordinates, Systematic or accumulation errors for the Reciprocal leveling, Determine Contour Interval and Contour Line Values, determine level of the sewer, and computation of area (regular and irregular figures) by using different methods.                                                                                                                                     |
| 9. Teaching and Learning Strategies                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Strategy</b>                                                                                                                 | Learning and teaching strategies in surveying will be designed to engage students in the subject matter while equipping them with the necessary knowledge and skills. These will be encouraged students to participate in the learning process through activities that require them to apply their knowledge. This can be accomplished through problem-solving exercises, case studies, and fieldwork. Also, encourage students to work in groups to solve problems and complete projects. This approach promotes teamwork, communication, and critical thinking skills. Fieldwork will be |

Provided opportunities for students to engage in real-world surveying activities. This could involve conducting surveys, collecting data, and analyzing the results in the field.

## 10. Course Structure

| Week | Hours | Required Learning Outcomes                                                                                                                                | Unit or subject name                                                             | Learning method                                                                                 | Evaluation method |
|------|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|-------------------|
| 1    | 5     | To understand different types of survey.(i)                                                                                                               | Introduction - Surveying by tape                                                 | Lectures on theory conducted in the classroom. A practical lecture conducted in the laboratory. |                   |
| 2    | 5     | Learn the Methods of locating a point or the types of coordinates (i).                                                                                    | Methods of locating a point or the types of coordinates,                         | Lectures on theory conducted in the classroom. A practical lecture conducted in the laboratory. | Quiz No.1         |
| 3    | 5     | To understand plane surveying instruments such as: tapes.(i). Learn how to correct errors due to temperature, Pull, Sag, and slope(iii).                  | Systematic or accumulation errors                                                | Lectures on theory conducted in the classroom. A practical lecture conducted in the laboratory. |                   |
| 4    | 5     | Learn how to correct errors due to temperature, Pull, Sag, and slope.(iii)                                                                                | Systematic or accumulation errors: Correction for Correction for pull or tension | Lectures on theory conducted in the classroom. A practical lecture conducted in the laboratory. | HW                |
| 5    | 5     | To learn how to draw a straight line and measure its distance using a tape measure in the presence of obstacles and choosing the appropriate method(iii). | Obstacles                                                                        | Lectures on theory conducted in the classroom. A practical lecture conducted in the laboratory. |                   |
| 6    | 5     | To understand plane surveying instruments such as levels(i).                                                                                              | Levelling, Projection building                                                   | Lectures on theory conducted in the classroom. A practical lecture conducted in the laboratory. |                   |
| 7    | 5     |                                                                                                                                                           | Mid-term Exam                                                                    |                                                                                                 | Mid-term Exam     |
| 8    | 5     | Learn how to calculate elevations (R.L) based on a staff reading by Rise and fall method (i) .                                                            | Procedure in levelling, Rise and fall method,                                    | Lectures on theory conducted in the classroom. A practical lecture                              |                   |

|    |   |                                                                                                                                      |                                                                                                         |                                                                                                 |            |
|----|---|--------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|------------|
|    |   |                                                                                                                                      |                                                                                                         | conducted in the laboratory.                                                                    |            |
| 9  | 5 | Learn how to calculate elevations (R.L) based on a staff reading by Height of collimation method(i) .                                | Height of collimation method                                                                            | Theoretical lectures in class and A lecture in the lab.                                         |            |
| 10 | 5 | Learn how to calculate elevations (R.L) based on a staff reading by Height of collimation method(iii)                                | Cross-sections,                                                                                         | Lectures on theory conducted in the classroom. A practical lecture conducted in the laboratory. | Quiz No.2  |
| 11 | 5 | Contour mapping using different methods and choosing the appropriate method(iii).                                                    | contouring, Gridding (The methods of square Radiating lines, Direct contouring                          | Lectures on theory conducted in the classroom.                                                  |            |
| 12 | 5 | Correcting elevations in different cases due to the curvature of the land or Refraction(i).                                          | Reciprocal leveling,                                                                                    | A practical lecture conducted in the laboratory.                                                |            |
| 13 | 5 | Correcting elevations in different cases due to the curvature of the land or Refraction(i). To determine the level of the sewer(iii) | Curvature and Refraction<br>Sewer                                                                       | Lectures on theory conducted in the classroom. A practical lecture conducted in the laboratory. |            |
| 14 | 5 | To determine the level of the sewer (iii)                                                                                            | Sewer                                                                                                   | Lectures on theory conducted in the classroom. A practical lecture conducted in the laboratory. |            |
| 15 | 5 | To calculate areas using different methods and choosing the appropriate method(iii).                                                 | Areas , Mechanical integration the planimeter, Areas enclosed by straight lines , and Irregular figures | Lectures on theory conducted in the classroom. A practical lecture conducted in the laboratory. |            |
| 16 | 3 |                                                                                                                                      | Preparatory week before final Exam                                                                      |                                                                                                 | final Exam |

### 11. Course Evaluation

| Evaluation type | Degree |
|-----------------|--------|
| 2 quizzes       | 10     |
| 1 homework      | 10     |
| classwork       | 20     |
| Term exam       | 15     |
| Final exam      | 50     |
| Total           | 100    |

| 12. Learning and Teaching Resources                                   |                                            |
|-----------------------------------------------------------------------|--------------------------------------------|
| Required textbooks (curricular books, if any)                         | Surveying (A.Bannister & S.Raymond)        |
| Main references (sources)                                             | Surveying by ( S.K.Hussin and M.SNagaraj ) |
| Recommended books and references<br>(scientific journals, reports...) | -----                                      |
| Electronic References, Websites                                       |                                            |

### Course Description Form

|                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|----------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>1. Course Name:</b>                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Computer II                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>2. Course Code:</b>                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| UOM 2032                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>3. Semester / Year:</b>                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Second / 2025–2026                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>4. Description Preparation Date:</b>                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 1/9/2025                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>5. Available Attendance Forms:</b>                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Lectures on theory conducted in the classroom.<br>A practical lecture conducted in the laboratory. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>6. Number of Credit Hours (Total) / Number of Units (Total)</b>                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 3 hours/ 3 credits                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>7. Course administrator's name (mention all, if more than one name)</b>                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Name:. Omar Kanaan Alsultan , Email: omar.alsultan@uomosul.edu.iq                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>8. Course Objectives</b>                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Course Objectives</b>                                                                           | <p>The Module aim is to prepare student to deal with computers. In addition to, teach the student the fundamentals of computers and its components. Furthermore, learning how use two of Microsoft Office applications (Word and Excel).</p> <p>Students successfully completing this course will be able to:</p> <ol style="list-style-type: none"> <li>1. Identify and discuss the hardware components of the computer system.</li> <li>2. Create documents using a word processor and create presentations.</li> <li>3. Conduct research on the Internet.</li> <li>4. Gain an introduction to Artificial Intelligence.</li> </ol> |
| <b>9. Teaching and Learning Strategies</b>                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Strategy</b>                                                                                    | <p>The basic strategy for delivering this module will focus on encouraging students' engagement in practical activities while simultaneously enhancing and expanding their critical thinking skills. This will be achieved by combining lectures, laboratory sessions and engaging students in external research on topics in computer technology that interest them.</p>                                                                                                                                                                                                                                                            |
| <b>10. Course Structure</b>                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

| Week | Hours | Required Learning Outcomes                                                                                                    | Unit or subject name                                                                                                                                            | Learning method                                                                                 | Evaluation method |
|------|-------|-------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|-------------------|
| 1    | 3     | <b>Security and Networking:</b> What is a network? Types of networks. Basic network components.                               | Network Security Basics. Understanding network threats. Network Troubleshooting                                                                                 | Lectures on theory conducted in the classroom. A practical lecture conducted in the laboratory. |                   |
| 2    | 3     | <b>E-Commerce:</b>                                                                                                            | Concepts of Electronic banking services this include online banking: ATM and debit card services, Phone banking, SMS banking, electronic alert, Mobile banking. | Lectures on theory conducted in the classroom. A practical lecture conducted in the laboratory. | Quiz No.1         |
| 3    | 3     | <b>Computer Troubleshooting:</b> Identifying and solving common hardware and software problems that computer users encounter, | Basic troubleshooting techniques and tools for diagnosing and resolving issues.                                                                                 | Lectures on theory conducted in the classroom. A practical lecture conducted in the laboratory. |                   |
| 4    | 3     | <b>Computer Troubleshooting:</b> Identifying and solving common hardware and software problems that computer users encounter, | Basic troubleshooting techniques and tools for diagnosing and resolving issues.                                                                                 | Lectures on theory conducted in the classroom. A practical lecture conducted in the laboratory. | HW                |
| 5    | 3     | <b>Introduction to AI:</b>                                                                                                    | Definition of AI, History of AI, AI Techniques and Approaches, Challenges and Ethical Considerations.                                                           | Lectures on theory conducted in the classroom. A practical lecture conducted in the laboratory. |                   |
| 6    | 3     | <b>Introduction to AI:</b>                                                                                                    | Definition of AI, History of AI, AI Techniques and Approaches, Challenges and Ethical Considerations.                                                           | Lectures on theory conducted in the classroom. A practical lecture conducted in the laboratory. |                   |
| 7    | 3     | <b>AI in Our Daily Lives:</b>                                                                                                 | AI in smartphones and virtual assistants like Siri or Google Assistant.)                                                                                        | Lectures on theory conducted in the classroom. A practical lecture conducted in the laboratory. |                   |
| 8    | 3     | <b>AI in Our Daily Lives:</b>                                                                                                 | AI in smartphones and virtual assistants like Siri or Google Assistant.)                                                                                        |                                                                                                 | Mid-term Exam     |

|    |   |                                               |                                                                                     |                                                                                                 |                   |
|----|---|-----------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|-------------------|
| 9  | 3 | <b>Applications of AI:</b>                    | Education, Healthcare, Finance, Transportation, Marketing and Advertising,          | Theoretical lectures in class and A lecture in the lab.                                         |                   |
| 10 | 3 | <b>Applications of AI:.</b>                   | Education, Healthcare, Finance, Transportation, Marketing and Advertising           | Lectures on theory conducted in the classroom. A practical lecture conducted in the laboratory. | Quiz No.2         |
| 11 | 3 | <b>Applications of AI:</b>                    | Education, Healthcare, Finance, Transportation, Marketing and Advertising,          | Lectures on theory conducted in the classroom.                                                  |                   |
| 12 | 3 | <b>AI and Society:</b>                        | (How AI affects social, AI a international relations, AI a the future of humanity.) | A practical lecture conducted in the laboratory.                                                |                   |
| 13 | 3 | <b>Ethical Challenges in AI:</b>              | <b>(AI ethics, privacy and surveillance, the impact of on the job market.)</b>      | Lectures on theory conducted in the classroom. A practical lecture conducted in the laboratory. | H.W               |
| 14 | 3 | <b>The Future of AI :</b>                     | <b>(Future trends in AI, recent research and emerging technologies.)</b>            | Lectures on theory conducted in the classroom. A practical lecture conducted in the laboratory. |                   |
| 15 | 3 | <b>Preparatory week before the final Exam</b> |                                                                                     | Lectures on theory conducted in the classroom. A practical lecture conducted in the laboratory. |                   |
| 16 | 3 |                                               | <b>Preparatory week before final Exam</b>                                           |                                                                                                 | <b>final Exam</b> |

### 11. Course Evaluation

| <b>Evaluation type</b> | <b>Degree</b> |
|------------------------|---------------|
| Quizzes                | 7.5           |
| Assignments            | 7.5           |
| Lab.                   | 10            |
| Report                 | 10            |
| Midterm Exam           | 10            |
| Final Exam             | 50            |
| <b>Total</b>           | <b>100</b>    |

### 12. Learning and Teaching Resources

|                                                                    |                                                                                                                                                                                                                                                                                                                              |
|--------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Required textbooks (curricular books, if any)                      | 1. Graham Brown, David Watson, "Cambridge IGCSE Information and Communication Technology", 3rd Edition (2020)                                                                                                                                                                                                                |
| Main references (sources)                                          |                                                                                                                                                                                                                                                                                                                              |
| Recommended books and references (scientific journals, reports...) | 2. Alan Evans, Kendall Martin, Mary Anne Poatsy, "Technology in Action Complete", 16th Edition (2020).<br><br>3. Ahmed Banafa, "Introduction to Artificial Intelligence (AI)", 1st Edition (2024).<br><br>4. الخضر علي الخضر باحث " أساسيات الحاسوب 2016<br>5. الدكتور عادل عبد النور, "مدخل إلى عالم الذكاء الاصطناعي" 2005 |
| Electronic References, Websites                                    |                                                                                                                                                                                                                                                                                                                              |

## Course Description Form

|                                                                     |                                                                                                                                                                                                                                                                                   |
|---------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Course Name:                                                     |                                                                                                                                                                                                                                                                                   |
| Building construction                                               |                                                                                                                                                                                                                                                                                   |
| 2. Course Code:                                                     |                                                                                                                                                                                                                                                                                   |
| DWRE 216                                                            |                                                                                                                                                                                                                                                                                   |
| 3. Semester / Year:                                                 |                                                                                                                                                                                                                                                                                   |
| 1/2025-2026                                                         |                                                                                                                                                                                                                                                                                   |
| 4. Description Preparation Date:                                    |                                                                                                                                                                                                                                                                                   |
| 1/9/2025                                                            |                                                                                                                                                                                                                                                                                   |
| 5. Available Attendance Forms:                                      |                                                                                                                                                                                                                                                                                   |
| Theoretical lectures in class                                       |                                                                                                                                                                                                                                                                                   |
| 6. Number of Credit Hours (Total) / Number of Units (Total)         |                                                                                                                                                                                                                                                                                   |
| 2/2                                                                 |                                                                                                                                                                                                                                                                                   |
| 7. Course administrator's name (mention all, if more than one name) |                                                                                                                                                                                                                                                                                   |
| Name: Noor Adrees Khattab Email: n.kattab@uomosul.edu.iq            |                                                                                                                                                                                                                                                                                   |
| 8. Course Objectives                                                |                                                                                                                                                                                                                                                                                   |
| Course Objectives                                                   | Brick and block works, Properties of fresh concrete, Stone works, Brick tests, Formwork and scaffolding, Test compressive strength of concrete, lintels, beams and columns, Block test, Floors and ceilings, Tiles tests, Steel reinforcement bars tests, Moisture blocker works. |
| 9. Teaching and Learning Strategies                                 |                                                                                                                                                                                                                                                                                   |
| Strategy                                                            | The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will                                                                |

|  |                                                                                                                                                                                                                                                                                                                                                                                                            |
|--|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p>be achieved through classes, interactive tutorials and by considering some challenging problems to motivate students.</p> <ul style="list-style-type: none"> <li>- Brick and block works. (i)</li> <li>- Stone works. (i)</li> <li>- Formworks and scaffolding. (i)</li> <li>- Lintels, beams and columns. (ii)</li> <li>- Floors and ceilings. (ii)</li> <li>- Moisture blocker works. (ii)</li> </ul> |
|--|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

#### 10. Course Structure

| Week  | Hours | Required Learning Outcomes                                                                    | Unit or subject name                                                         | Learning method               | Evaluation method |
|-------|-------|-----------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|-------------------------------|-------------------|
| 1     | 2     | Introduction; syllabus; Brick and block works.. (i)                                           | Introduction; syllabus; Brick and block works                                | Theoretical lectures in class | Exam              |
| 2-3   | 4     | Learn Brick and block works, Brick test. (i)                                                  | Brick and block works, Brick test                                            | Theoretical lectures in class | HW & Exam         |
| 4-5   | 4     | Learn about the reclamation of Introduction, Stone works. (i)                                 | Introduction, Stone works                                                    | Theoretical lectures in class | HW & Exam         |
| 6     | 2     | Learn the Stone works, Properties of fresh concrete. (ii)                                     | Stone works, Properties of fresh concrete                                    | Theoretical lectures in class | HW & Exam         |
| 7-8   | 4     | Studying the Formworks and scaffolding. (ii)                                                  | Formworks and scaffolding                                                    | Theoretical lectures in class | HW & Exam         |
| 9     | 2     | Identifying the Lintels, beams and columns, Block test, Tiles tests. (i)                      | Lintels, beams and columns, Block test, Tiles tests                          | Theoretical lectures in class | HW & Exam         |
| 10    | 2     | Learn the the Lintels, beams and columns, Block test, Tiles tests. (ii)                       | the Lintels, beams and columns, Block test, Tiles tests                      | Theoretical lectures in class | HW & Exam         |
| 11-13 | 6     | Designing Floors and ceilings, Moisture blocker works, Steel reinforcement bars tests.. (ii)  | Floors and ceilings, Moisture blocker works, Steel reinforcement bars tests. | Theoretical lectures in class | HW & Exam         |
| 14    | 2     | Identifying Floors and ceilings, Moisture blocker works, Steel reinforcement bars tests. (ii) | Floors and ceilings, Moisture blocker works, Steel reinforcement bars tests  | Theoretical lectures in class | HW & Exam         |
| 15    | 2     | Learn Floors and ceilings, Moisture blocker works, Steel reinforcement bars tests. (ii) (i)   | Floors and ceilings, Moisture blocker works, Steel reinforcement bars tests  | Theoretical lectures in class | Exam              |

| 11. Course Evaluation                                              |                                                                                                                                                                                                                                                                                                                                                                                                                 |
|--------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Evaluation type                                                    | Degree                                                                                                                                                                                                                                                                                                                                                                                                          |
| 3 Term exam                                                        | 30                                                                                                                                                                                                                                                                                                                                                                                                              |
| Midterm exam                                                       | 20                                                                                                                                                                                                                                                                                                                                                                                                              |
| Final exam                                                         | 50                                                                                                                                                                                                                                                                                                                                                                                                              |
| Total                                                              | 100                                                                                                                                                                                                                                                                                                                                                                                                             |
| 12. Learning and Teaching Resources                                |                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Required textbooks (curricular books, if any)                      | <ul style="list-style-type: none"> <li>o Construction of buildings, by Zuhair Saku and Artin Levon.</li> </ul>                                                                                                                                                                                                                                                                                                  |
| Main references (sources)                                          | <ul style="list-style-type: none"> <li>o Test of materials, by Yousif Al Duaf.</li> <li>o Concrete mixtures, written by Dr. Ibrahim Ali Al Darwish, Dr. Abdul Wahab Awad.</li> <li>o Concrete Mix Design</li> <li>o Appendix issued by the Laboratory of testing of construction materials including</li> <li>Details and vocabulary for the testing of construction materials.</li> <li>o ACI code.</li> </ul> |
| Recommended books and references (scientific journals, reports...) | -----                                                                                                                                                                                                                                                                                                                                                                                                           |
| Electronic References, Websites                                    | -----                                                                                                                                                                                                                                                                                                                                                                                                           |

|                                                        |
|--------------------------------------------------------|
| 1. اسم المقرر:                                         |
| اللغة العربية 2 / Arabic Language2                     |
| 2. رمز المقرر:                                         |
| UOM 2012                                               |
| 3. الفصل / السنة:                                      |
| الاول / 2025-2026                                      |
| 4. تاريخ إعداد هذا الوصف                               |
| 1/9/2025                                               |
| 5. أشكال الحضور المتاحة :                              |
| حضورياً                                                |
| 6. عدد الساعات الدراسية (الكلي) / عدد الوحدات (الكلي): |
| عدد الساعات النظري (30) / عدد الوحدات (2)              |
| 7. اسم مسؤول المقرر الدراسي ( إذا اكثر من اسم يذكر)    |
| المدرس : م.د اينااس عطوان سليمان                       |
| 8. اهداف المقرر                                        |
| - التعرف على أساسيات قواعد اللغة العربية               |

- اكتساب الطالب المهارة في الكتابة العربية من تصحيح الأخطاء الواردة في الكتابة ومعرفة القواعد النحوية والاملائية التي تصون اللسان عن الخطأ
- أن يفهم الطالب مدى أهمية اللغة العربية وقواعدها في الدراسات الانسانية وفي كتابة البحوث والتقارير
- تنمية القدرة لدى المتعلم على التحدث باللغة العربية، ما أمك
- تزويد المتعلم بالمادة اللغوية والمفاهيم الفكرية والمعارف الاملائية والنحوية والدلالية بحيث يتمكن بها من فهم واستيعاب النصوص وتطبيقها على أساليب الكلام
- تمكين الطالب من القراءة الصحيحة.

## 9. استراتيجيات التعليم والتعلم

- الكتاب المنهجي.
- الحلقات النقاشية
- خلق محاضرة تفاعلية بين الطالب والأستاذ في عرض المادة
- استعمال البور بوينت في توضيح موضوعات الدرس.
- تكليف الطالب ببعض الأنشطة والواجبات.

## 10. بنية المقرر

| الأسبوع | الساعات | مخرجات التعلم المطلوبة                                                                    | اسم الوحدة / أو الموضوع                   | طريقة التعليم   | طريقة التقييم                                                                             |
|---------|---------|-------------------------------------------------------------------------------------------|-------------------------------------------|-----------------|-------------------------------------------------------------------------------------------|
| 1       | 2       | A1 : أن يعرف الطالب الكلمة ثم يذكر أقسامها (الاسم- الفعل - والحرف)                        | اللغة العربية / أقسام الكلمة وتعريفاتها   | محاضرات وتقارير | الامتحانات اليومية،<br>الواجبات،<br>النقاش وحل التمارين<br>داخل المحاضرة،<br>تفاعل الطالب |
| 2       | 2       | A4 : أن يفرق الطالب بين همزتين القطع والوصل في اللفظ والكتابة                             | النطق بهمزة القطع والوصل                  | محاضرات         | الامتحانات اليومية،<br>الواجبات،<br>النقاش وحل التمارين<br>داخل المحاضرة،<br>تفاعل الطالب |
| 3       | 2       | A5 : أن يميز الطالب في كتابة القواعد الاساسية لكتابة الهمزة بالشكل الصحيح                 | قواعد كتابة الهمزة                        | محاضرات         | الامتحانات اليومية،<br>الواجبات،<br>النقاش وحل التمارين<br>داخل المحاضرة،                 |
| 4       | 2       | A4 : أن يفرق الطالب في كتابة التاء المربوطة والتاء المفتوحة في اخر الاسماء                | كتابة التاء في اخر الكلمة                 | محاضرات         | واجب بيتي                                                                                 |
| 5       | 2       | B6 : أن يبحث الطالب في المعاجم عن الخطوات التي يجب اتباعها عند الحاجة لمعرفة معنى كلمة ما | طريقة الكشف عن الكلمات في المعاجم العربية | محاضرات         | الامتحانات اليومية،<br>الواجبات،                                                          |

|                                                                                           |           |                                                                |                                                                                           |   |    |
|-------------------------------------------------------------------------------------------|-----------|----------------------------------------------------------------|-------------------------------------------------------------------------------------------|---|----|
| النقاش وحل التمارين<br>داخل المحاضرة،<br>تفاعل الطالب                                     |           |                                                                |                                                                                           |   |    |
| الامتحانات اليومية،<br>الواجبات،<br>النقاش وحل التمارين<br>داخل المحاضرة،<br>تفاعل الطالب | محاضرات   | المبني والمعرب وعلامات الاعراب<br>الاصلية والفرعية             | A5 : ان يميز الطالب ويبين الفرق بين المبني<br>والمعرب وعلامات الأعراب الأصلية والفرعية    | 2 | 6  |
| الامتحانات اليومية،<br>الواجبات،<br>النقاش وحل التمارين<br>داخل المحاضرة،<br>تفاعل الطالب | محاضرات   | الجملة الاسمية                                                 | A2 : ان يفهم الطالب الجزئين الرئيسيين للجملة<br>الاسمية وهما المبتدأ والخبر               | 2 | 7  |
| الامتحانات اليومية،<br>الواجبات،<br>النقاش وحل التمارين<br>داخل المحاضرة،<br>تفاعل الطالب | محاضرات   | افعال المقاربة والرجاء والشروع                                 | C1 : ان يوضح للطالب اهم الاختلافات بين<br>افعال المقاربة والرجاء وعملها للجملة الاسمية    | 2 | 8  |
| اختبار شفهي                                                                               | حل تمارين | احكام العدد من حيث الاعراب والبناء<br>ومن حيث التعريف والتنكير | A5 : ان يميز الطالب بين الاعداد المعربة والاعداد<br>المبنية ويميز كذلك بين العرفة والتكره | 2 | 9  |
| الامتحانات اليومية،<br>الواجبات،<br>النقاش وحل التمارين<br>داخل المحاضرة،<br>تفاعل الطالب | محاضرات   | علامات التقييم                                                 | A1 : ان يعرف الطالب اهمية علامات التقييم في<br>الكتابة                                    | 2 | 10 |
| الامتحانات اليومية،<br>الواجبات،<br>النقاش وحل التمارين<br>داخل                           | محاضرات   | الأخطاء اللغوية                                                | B2 : ان يظهر الفرق بين الاخطاء الاملائية<br>والاخطاء اللغوية في الكتابة                   | 2 | 11 |
| الامتحانات اليومية،<br>الواجبات،<br>النقاش وحل التمارين<br>داخل المحاضرة،<br>تفاعل الطالب | محاضرات   | الافعال الناقصة                                                | A2 : أن يشرح الطالب الافعال الناقصة والتغير<br>الذي يحدث على الجملة الاسمية بدخولها عليها | 2 | 12 |
| الامتحانات اليومية،<br>الواجبات،<br>النقاش وحل التمارين<br>داخل المحاضرة،<br>تفاعل الطالب | محاضرات   | النطق كتابة الضاد والطاء                                       | C7 : ان يبين الفرق بالنطق بين حرفين الضاد<br>والطاء                                       | 2 | 13 |
| الامتحانات اليومية،<br>الواجبات،<br>النقاش وحل التمارين<br>داخل المحاضرة،<br>تفاعل الطالب | محاضرات   | التغاير الصرفي                                                 | A2 : ان يصنف الطالب الفرق بين المنقوص<br>والمقصور والممدود                                | 2 | 14 |

|                                       |         |               |                                                                |   |    |                                                                                      |
|---------------------------------------|---------|---------------|----------------------------------------------------------------|---|----|--------------------------------------------------------------------------------------|
| واجب بيتي                             | محاضرات | الشعر وانواعه | B8 : يكتب نبذة عن عناصر الشعر                                  | 2 | 15 | 11. تقييم المقرر                                                                     |
| الحضور 1%                             |         |               |                                                                |   |    | الواجبات 4%                                                                          |
| اختبار قصيرة (Quiz) 5%                |         |               |                                                                |   |    | الاسابيع الثالث، الاسبوع الخامس، الاسبوع السابع، الاسبوع التاسع، الاسبوع الحادي عشر) |
| امتحان فصلي اول 15% (الاسبوع السادس)  |         |               |                                                                |   |    | امتحان فصلي ثاني 15% (الاسبوع الرابع عشر)                                            |
| درجة سعي 40%                          |         |               |                                                                |   |    | الامتحان النهائي 60 %                                                                |
| الدرج النهائية 100%                   |         |               |                                                                |   |    | 12. مصادر التعلم والتدريس                                                            |
| النحو الوافي – عباس حسن               |         |               | مقررة المطلوبة ( المنهجية أن وجدت )                            |   |    | الكتب                                                                                |
| كتاب النحو المبسط ,للشيخ ادهم العاسمي |         |               | الرئيسية ( المصادر)                                            |   |    | المراجع                                                                              |
| لا يوجد                               |         |               | المراجع الساندة التي يوصى بها (المجلات العلمية، التقارير.... ) |   |    | الكتب                                                                                |
| لا يوجد                               |         |               | الإلكترونية، مواقع الانترنت                                    |   |    | المراجع                                                                              |

## Course Description Form

|                                                                     |                                                                                                                                                                                                                                                                                                                        |
|---------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Course Name:                                                     |                                                                                                                                                                                                                                                                                                                        |
| Differential Equations                                              |                                                                                                                                                                                                                                                                                                                        |
| 2. Course Code:                                                     |                                                                                                                                                                                                                                                                                                                        |
| DWRE 221                                                            |                                                                                                                                                                                                                                                                                                                        |
| 3. Semester / Year:                                                 |                                                                                                                                                                                                                                                                                                                        |
| Second / 2025–2026                                                  |                                                                                                                                                                                                                                                                                                                        |
| 4. Description Preparation Date:                                    |                                                                                                                                                                                                                                                                                                                        |
| 1/9/2025                                                            |                                                                                                                                                                                                                                                                                                                        |
| 5. Available Attendance Forms:                                      |                                                                                                                                                                                                                                                                                                                        |
| Lectures on theory and tutorial conducted in the classroom.         |                                                                                                                                                                                                                                                                                                                        |
| 6. Number of Credit Hours (Total) / Number of Units (Total)         |                                                                                                                                                                                                                                                                                                                        |
| 4 hours/ 2 credits                                                  |                                                                                                                                                                                                                                                                                                                        |
| 7. Course administrator's name (mention all, if more than one name) |                                                                                                                                                                                                                                                                                                                        |
| Name: Dr. Muhanad Talal , Email: mohanad_alsheer@uomosul.edu.iq     |                                                                                                                                                                                                                                                                                                                        |
| 8. Course Objectives                                                |                                                                                                                                                                                                                                                                                                                        |
| Course Objectives                                                   | To introduce students to the concept of differential equations and their significance in engineering and scientific applications. To provide students with the necessary skills to solve first order differential equations using separation of variables, and to classify them as homogeneous, non-homogeneous, exact |

|  |                                                                                                                                                                                                                                                                                                                                                                                    |
|--|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | and non-exact D.E's. To teach students how to solve linear and non-linear first order differential equations, as well as higher order differential equations. To familiarize students with the solution of second and higher order linear differential equations, with both constant and variable coefficients, and to teach them how to apply the variation of parameters method. |
|--|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## 9. Teaching and Learning Strategies

|                 |                                                                                                                                                                                                                                                                                                                                                                                              |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Strategy</b> | The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students. |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## 10. Course Structure

| Week  | Hours | Required Learning Outcomes                                                        | Unit or subject name                                                                                                      | Learning method    | Evaluation method |
|-------|-------|-----------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|--------------------|-------------------|
| 1     | 4     | Understanding of the fundamental concepts of Differential Equation                | Defintion, Forming, Order and Degree of Differential Equation                                                             | A lecture in class |                   |
| 2     | 4     | Used Differential Equation to solution first order D.E by .Separation             | Solution of the first order D.E.Separation of variables                                                                   | A lecture in class | H.W               |
| 3     | 4     | Used Differential Equation to solution first order D.E by . Homogeneous and exact | Homogeneous, non-homogeneous Exact and not exact D.E                                                                      | A lecture in class |                   |
| 4     | 4     | Used Differential Equation to solution first order D.E by .linear                 | Linear and nonlinear first o D.E                                                                                          | A lecture in class | Exam              |
| 5     | 4     | Used three methods solution First order higher degree D.E                         | First order and higher degree D.E                                                                                         | A lecture in class | H.W               |
| 6-10  | 16    | Used methods to solution equations                                                | Solution of second and higher order linear D.E & Solution of second and higher order linear D.E with constant coefficient |                    | H.W, C.W and Exam |
| 10-13 | 16    | Used methods to solution equations                                                | Physical and engineering application on order & Physical engineering application on order D                               |                    | H.W, C.W and Exam |
| 13-15 |       | Understanding of the fundamental concepts of Laplace Transform                    | Laplace Transform                                                                                                         |                    |                   |

|                                                                       |   |  |                                                                     |  |            |
|-----------------------------------------------------------------------|---|--|---------------------------------------------------------------------|--|------------|
| 16                                                                    | 3 |  | Preparatory week before<br>final Exam                               |  | final Exam |
| 11. Course Evaluation                                                 |   |  |                                                                     |  |            |
| Evaluation type                                                       |   |  | Degree                                                              |  |            |
| Quizzes / 3                                                           |   |  | 24                                                                  |  |            |
| Assignments / 5                                                       |   |  | 10                                                                  |  |            |
| Report                                                                |   |  | 3                                                                   |  |            |
| seminars                                                              |   |  | 3                                                                   |  |            |
| Midterm Exam                                                          |   |  | 10                                                                  |  |            |
| Final exam                                                            |   |  | 50                                                                  |  |            |
| Total                                                                 |   |  | 100                                                                 |  |            |
| 12. Learning and Teaching Resources                                   |   |  |                                                                     |  |            |
| Required textbooks (curricular books, if any)                         |   |  | Theory and Problems of Differential Equations                       |  |            |
| Main references (sources)                                             |   |  | By Frank Ayres, JR, PhD<br>Advanced Engineering Mathematics By Dass |  |            |
| Recommended books and references<br>(scientific journals, reports...) |   |  | -----                                                               |  |            |
| Electronic References, Websites                                       |   |  |                                                                     |  |            |

## Course Description Form

|                                                                                                                       |
|-----------------------------------------------------------------------------------------------------------------------|
| <b>1. Course Name:</b>                                                                                                |
| Fluid Mechanics II                                                                                                    |
| <b>2. Course Code:</b>                                                                                                |
| DWRE 222                                                                                                              |
| <b>3. Semester / Year:</b>                                                                                            |
| Second 2025–2026                                                                                                      |
| <b>4. Description Preparation Date:</b>                                                                               |
| 1/9/2025                                                                                                              |
| <b>5. Available Attendance Forms:</b>                                                                                 |
| Lectures and Tutorials                                                                                                |
| <b>6. Number of Credit Hours (Total) / Number of Units (Total)</b>                                                    |
| 5 hr/5 credits                                                                                                        |
| <b>7. Course administrator's name (mention all, if more than one name)</b>                                            |
| Name: Azza Nasralla Jaralla Al-Talib<br>Email: <a href="mailto:a.altalib@uomosul.edu.iq">a.altalib@uomosul.edu.iq</a> |
| <b>8. Course Objectives</b>                                                                                           |

|                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Course Objectives</b> | <ul style="list-style-type: none"> <li>• Inform students about the kinematics of flow motion</li> <li>• learn continuity equation and conversation of mass principle</li> <li>• learn Bernoulli equation for incompressible fluid and conversation of energy principle</li> <li>• learn the working principles of pumps and turbines and their applications</li> <li>• learn the working principles of Venturi meter and applications</li> <li>• learn the working principles of orifice meter and applications</li> <li>• learn the working principles of pitot tube and applications</li> <li>• learn impulse–momentum equation and applications</li> </ul> |
|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## 9. Teaching and Learning Strategies

|                 |                                                                                                                                                                                      |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Strategy</b> | The strategy is to provide theoretical lectures using presentations and video also question solving interactively with students inside the classroom, as well as tutorial exercises. |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## 10. Course Structure

| <b>Week</b> | <b>Hours</b> | <b>Required Learning Outcomes</b>                                                      | <b>Unit or subject name</b>                                                      | <b>Learning method</b>       | <b>Evaluation method</b> |
|-------------|--------------|----------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|------------------------------|--------------------------|
| 1           | 4            | Learn the Kinematics of fluid motion                                                   | Kinematics of fluid motion                                                       | presentation                 | Monthly exam             |
| 2           | 4            | learn continuity equation and conversation of mass principle                           | continuity equation and conversation of mass principle with applications         | Presentation And white board | Monthly exam             |
| 4&3         | 6            | learn Bernoulli equation for incompressible fluid and conversation of energy principle | Bernoulli equation for incompressible fluid and conversation of energy principle | Presentation And white board | Monthly exam             |
| 4           | 2            | exam                                                                                   |                                                                                  |                              |                          |
| 5&6         | 8            | Learn working principles of pumps and turbines and their applications                  | Pumps and turbines in Bernoulli equation                                         | Presentation And white board | Monthly Exam             |
| 7&8         | 6            | Learn working principles of Venturi meter and applications                             | Venturi meter                                                                    | Presentation And white board | Monthly Exam             |
| 8           | 2            | exam                                                                                   |                                                                                  |                              |                          |

|           |    |                                                            |                           |                              |              |
|-----------|----|------------------------------------------------------------|---------------------------|------------------------------|--------------|
| 9&10      | 8  | Learn working principles of orifice meter and applications | orifice meter             | Presentation And white board | Monthly Exam |
| 11&12     | 8  | Learn working principles of pitot tube and applications    | pitot tube                | Presentation And white board | Monthly Exam |
| 13-14 &15 | 10 | Learn impulse-momentum equation and applications           | impulse-momentum equation | Presentation And white board | Monthly Exam |
| 15        | 2  | exam                                                       |                           |                              |              |

### **Laboratory Experiments:**

| Week      | Hours | Required Learning Outcomes                             | Unit or subject name                             | Learning method        | Evaluation method    |
|-----------|-------|--------------------------------------------------------|--------------------------------------------------|------------------------|----------------------|
| 1         | 2     | Learn how to write the Report                          | Writing report                                   | presentation           | Experimental reports |
| 2,3,4     | 6     | Bernoulli's equation                                   | Proof Bernoulli's equation                       | Laboratory experiments | Experimental Reports |
| 4,6,7     | 6     | Learn Discharge Measurements in Pipes by Vanturi Meter | Discharge Measurements in Pipes by Vanturi Meter | Laboratory experiments | Experimental reports |
| 8,9,10    | 6     | Calculate Friction Factor in Pipes                     | Friction Factor in Pipes                         | Laboratory experiments | Experimental reports |
| 11,12 ,13 | 6     | Learn Discharge Measurement in Open Channel by Weirs   | Discharge Measurement Channel by Weirs           | Laboratory experiments | Experimental reports |
| 14&15     | 4     | Final lab exam                                         |                                                  |                        |                      |

### **11. Course Evaluation**

| Evaluation type | degree |
|-----------------|--------|
| 2 Quizzes       | 10     |
| 2 h.w.          | 10     |
| lab             | 20     |
| Mid exam        | 10     |
| Final exam      | 50     |
| total           | 100    |

### **12. Learning and Teaching Resources**

|                                               |                                                                    |
|-----------------------------------------------|--------------------------------------------------------------------|
| Required textbooks (curricular books, if any) | Elementary fluid mechanics<br>By: Vinnard 6 <sup>th</sup> ed. 1981 |
|-----------------------------------------------|--------------------------------------------------------------------|

|                                                                       |                                                                                                         |
|-----------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|
| Main references (sources)                                             | Fluid mechanic and Hydraulic machines<br>By: Bansal 9 <sup>th</sup> ed. 2010                            |
| Recommended books and references<br>(scientific journals, reports...) |                                                                                                         |
| Electronic References, Websites                                       | <a href="https://uclouvain.be/en-cours-2023-lbres2104">https://uclouvain.be/en-cours-2023-lbres2104</a> |

## Course Description Form

|                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Course Name:                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Structures                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 2. Course Code:                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| DWRE223                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 3. Semester / Year:                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Spring 2025–2026                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 4. Description Preparation Date:                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 1/9/2025                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 5. Available Attendance Forms:                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Theoretical lectures in class                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 6. Number of Credit Hours (Total) / Number of Units (Total)                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 6 / 5                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 7. Course administrator's name (mention all, if more than one name)                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Name: Dr. Saddam M. AHMED    Email: <a href="mailto:ahmed.saddam@uomosul.edu.iq">ahmed.saddam@uomosul.edu.iq</a><br>Assistant Instructor: Dr. Mohammed M. Khalaf |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 8. Course Objectives                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Course Objectives</b>                                                                                                                                         | <p>In DWRE 223, initially students will learn how to analysis and assess the Internal strength and deformation for systems. Upon successful completion of this course the student shall be able to assess the:</p> <ul style="list-style-type: none"> <li>- Evaluate stability and determinacy of structures.</li> <li>- Analyze statically determinate structures and gates.</li> <li>- Evaluate elastic deformation using integration and conjugate beam methods.</li> <li>- Analyze indeterminate beams, frames, and trusses (first degree of indeterminacy).</li> <li>- Analyze indeterminate frames (multiple degrees) using moment distribution method.</li> <li>- Use computer software to analyze different types of structures.</li> </ul> |
| 9. Teaching and Learning Strategies                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Strategy</b> | PowerPoint presentations and multimedia tools are used in classrooms. Examples and problems are solved on the board during lectures. Tutorial sessions are held to enhance student engagement. Students are encouraged to research topics online, including similar course materials from other universities. MS Excel is used for project preparation. Students can access solved problems, spreadsheets, past exams, and more on the course website. The instructor answers content-related questions via official university email. Technical questions should be discussed during tutorial hours, office hours, or by appointment. Emails must be sent from official university accounts; others will not receive a reply. |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## 10. Course Structure

| Week    | Hours | Required Learning Outcomes | Unit or subject name                                                                                                                | Learning method | Evaluation method |
|---------|-------|----------------------------|-------------------------------------------------------------------------------------------------------------------------------------|-----------------|-------------------|
| 1       | 5     | i                          | Introduction to structural types, basic principles, units, numerical computation, rigid body equilibrium, basic structural analysis | Lectures        | Ass 1             |
| 2       | 5     | i                          | Structural stability and determinacy, analysis of statically determinate structures                                                 | Lectures        | HW1               |
| 3 & 4   | 10    | i                          | Analysis of statically determinate structures, drawing shear force and bending moment diagrams                                      | Lectures        | Ass 2             |
| 5       | 5     | i                          | Analysis of statically determinate trusses using joint and section methods                                                          | Lectures        | Quiz 1, HW2       |
| 6       | 5     | i                          | Elastic slope and deflection of beams using integration method                                                                      | Lectures        | Report1           |
| 7       | 5     | i                          | Elastic slope and deflection of beams using conjugate beam method                                                                   | Lectures        | Ass3              |
| 8 & 9   | 10    | i                          | Elastic slope and deflection of frames                                                                                              | Lectures        | Quiz 2, HW3       |
| 10      | 5     | i                          | Analysis of indeterminate frames using least work method                                                                            | Lectures        | Report 2          |
| 11      | 5     | i                          | Analysis of indeterminate trusses using least work method                                                                           | Lectures        | Ass4              |
| 12 & 13 | 10    | i                          | Analysis of indeterminate frames using moment distribution method                                                                   | Lectures        | HW4               |
| 14      | 5     | i                          | Analysis of indeterminate structures (frames, trusses, gates) using software                                                        | Lectures        | Project           |

## 11. Course Evaluation

| Evaluation type          | Degree  |
|--------------------------|---------|
| Two Quizzes (3 pts each) | 7 pts   |
| Midterm Exam             | 14 pts  |
| Homework (each 2 pts)    | 8 pts   |
| Assignments (each 2 pts) | 8 pts   |
| Two Reports (3 pts each) | 6 pts   |
| Project                  | 7 pts   |
| Final Exam               | 50 pts  |
| Total                    | 100 pts |

## 12. Learning and Teaching Resources

|                                               |                                                                                                    |
|-----------------------------------------------|----------------------------------------------------------------------------------------------------|
| Required textbooks (curricular books, if any) | R C., HIBBELER (2011) " <a href="#">Mechanics of Materials</a> ", eight Edition, PEARSON, ISBN 13: |
|-----------------------------------------------|----------------------------------------------------------------------------------------------------|

|                                                                    |                                                                       |
|--------------------------------------------------------------------|-----------------------------------------------------------------------|
|                                                                    | 978-0-13-602230-5, USA. (can be downloaded from the Course web page). |
| Main references (sources)                                          | Elementary Theory of Structures by Yuan-Yu Hsieh, Prentice-Hall, 1980 |
| Recommended books and references (scientific journals, reports...) | -----                                                                 |
| Electronic References, Websites                                    | -----                                                                 |

### Course Description Form

|                                                                                                                                 |                                                                                                                                                                                                                                                                                                           |
|---------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Course Name:                                                                                                                 |                                                                                                                                                                                                                                                                                                           |
| Areas and Volumes                                                                                                               |                                                                                                                                                                                                                                                                                                           |
| 2. Course Code:                                                                                                                 |                                                                                                                                                                                                                                                                                                           |
| DWRE 224                                                                                                                        |                                                                                                                                                                                                                                                                                                           |
| 3. Semester / Year:                                                                                                             |                                                                                                                                                                                                                                                                                                           |
| Second / 2025–2026                                                                                                              |                                                                                                                                                                                                                                                                                                           |
| 4. Description Preparation Date:                                                                                                |                                                                                                                                                                                                                                                                                                           |
| 1/9/2025                                                                                                                        |                                                                                                                                                                                                                                                                                                           |
| 5. Available Attendance Forms:                                                                                                  |                                                                                                                                                                                                                                                                                                           |
| Lectures on theory conducted in the classroom.<br>A practical lecture conducted in the laboratory.                              |                                                                                                                                                                                                                                                                                                           |
| 6. Number of Credit Hours (Total) / Number of Units (Total)                                                                     |                                                                                                                                                                                                                                                                                                           |
| 5hours/ 4credits                                                                                                                |                                                                                                                                                                                                                                                                                                           |
| 7. Course administrator's name (mention all, if more than one name)                                                             |                                                                                                                                                                                                                                                                                                           |
| Name: Dr. Omar Muqdad Abdulgany, Email: o.agma@uomosul.edu.iq<br>Name: Alaa Ismael Nasar, Email: engalaaismail79@uomosul.edu.iq |                                                                                                                                                                                                                                                                                                           |
| 8. Course Objectives                                                                                                            |                                                                                                                                                                                                                                                                                                           |
| <b>Course Objectives</b>                                                                                                        | Surveying II aims to teach students how to calculate the earthworks and reservoir volume from contour maps, bearing of lines, designation of bearing, theodolite, construction adjustment of the theodolite, measurement of angles, traverse surveys and their adjustment, tachometer, and total station. |
| 9. Teaching and Learning Strategies                                                                                             |                                                                                                                                                                                                                                                                                                           |
| <b>Strategy</b>                                                                                                                 | Learning and teaching strategies in surveying will be designed to engage students in the subject matter while equipping them with the necessary knowledge and skills. These will be encouraged                                                                                                            |

students to participate in the learning process through activities that require them to apply their knowledge. This can be accomplished through problem-solving exercises, case studies, and fieldwork. Also, encourage students to work in groups to solve problems and complete projects. This approach promotes teamwork, communication, and critical thinking skills. Fieldwork will be provided opportunities for students to engage in real-world surveying activities. This could involve conducting surveys, collecting data, and analyzing the results in the field.

## 10. Course Structure

| Week | Hours | Required Learning Outcomes                                                                                                | Unit or subject name                                                                                                                                       | Learning method                                                                                    | Evaluation method |
|------|-------|---------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|-------------------|
| 1    | 5     | To calculate areas using different methods(i)                                                                             | Introduction, Irregular figures, Give and take lines, Counting squares.                                                                                    | Lectures on theory conducted in the classroom.<br>A practical lecture conducted in the laboratory. |                   |
| 2    | 5     | To calculate areas using different methods(i). and choosing the appropriate method(iii).                                  | Counting squares, Trapezoidal Rule, Simpson Rule (for odd number),                                                                                         | Lectures on theory conducted in the classroom.<br>A practical lecture conducted in the laboratory. | Quiz No.1         |
| 3    | 5     | To calculate volumes using different methods(i) and choose the appropriate method for calculating earthwork volumes (iii) | Volumes Earthwork calculation, Volumes from cross-sections, Sections level a cross ( one level section), Sections with a cross fall ( two level section ). | Lectures on theory conducted in the classroom.<br>A practical lecture conducted in the laboratory. |                   |
| 4    | 5     | To calculate volumes using different methods(i) and choose the appropriate method for calculating earthwork volumes (iii) | Sections part in cut and part in fill, Section of variable level ( three level section), Multi-level section                                               | Lectures on theory conducted in the classroom.<br>A practical lecture conducted in the laboratory. | HW                |
| 5    | 5     | To calculate volumes using different methods(i) and choose the appropriate method for calculating earthwork volumes (iii) | Computation of volumes, middle areas, end areas, Prismoidal formula.                                                                                       | Lectures on theory conducted in the classroom.<br>A practical lecture conducted in the laboratory. |                   |
| 6    | 5     | To calculate volumes using the volume of a pyramid, and the Volume of wedge.                                              | The volume of a pyramid<br>The Volume of wedge.                                                                                                            | Lectures on theory conducted in the classroom.<br>A practical lecture conducted in the laboratory. |                   |
| 7    | 5     | To calculate volumes using Simpson's , spot levels (i) and choose the appropriate method for                              | Simpson's Rule<br>Volumes, Volumes from levels or (volume of Borrow pits)<br>Volume from contour lines                                                     | Lectures on theory conducted in the classroom.                                                     |                   |

|    |   |                                                                                                                |                                                                                                   |                                                                                                 |               |
|----|---|----------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|---------------|
|    |   | calculating earthwork volumes (iii)                                                                            |                                                                                                   | A practical lecture conducted in the laboratory.                                                |               |
| 8  | 5 | To use plane surveying instruments such as: Theodolite.                                                        | Mid-term Exam, Bearing Designation of Bearing                                                     |                                                                                                 | Mid-term Exam |
| 9  | 5 | Learn how to calculate back bearing from angles(i) .                                                           | Deflection angle, Fore Back Bearings. Calculation of bearings from angles,                        | Theoretical lectures in class and A lecture in the lab.                                         |               |
| 10 | 5 | Learn how to calculate deflection angles from included angles(i)                                               | Calculation of deflection angles from included angles, Quiz No.2                                  | Lectures on theory conducted in the classroom. A practical lecture conducted in the laboratory. | Quiz No.2     |
| 11 | 5 | To use plane surveying instruments such as: Theodolite.(i).                                                    | The theodolite and traverse surveying, Traverse computations, Latitudes and departure.            | Lectures on theory conducted in the classroom.                                                  |               |
| 12 | 5 | Correcting angles and lengths of sides using various methods (iii).                                            | Closing error, Graphical adjustment, bowditch's rule, Transit rule, Distribution of angular error | A practical lecture conducted in the laboratory.                                                |               |
| 13 | 5 | To use plane surveying instruments such as: Tachometry (iii)                                                   | Tachometry, Optical principle Determine the stadia intercept factor                               | Lectures on theory conducted in the classroom. A practical lecture conducted in the laboratory. | H.W           |
| 14 | 5 | To determine the distance using Tachometry and to use plane surveying instruments such as: Total station (iii) | Tachometry, Optical principle, Total station                                                      | Lectures on theory conducted in the classroom. A practical lecture conducted in the laboratory. |               |
| 15 | 5 | to use plane surveying instruments such as: Total station (iii)                                                | Total station                                                                                     | Lectures on theory conducted in the classroom. A practical lecture conducted in the laboratory. |               |
| 16 | 3 |                                                                                                                | Preparatory week before final Exam                                                                |                                                                                                 | final Exam    |

### 11. Course Evaluation

| Evaluation type | Degree |
|-----------------|--------|
| 2 quizzes       | 7.5    |
| 2 homework      | 7.5    |
| classwork       | 20     |
| Term exam       | 15     |

|                                                                       |                                                                                           |
|-----------------------------------------------------------------------|-------------------------------------------------------------------------------------------|
| Final exam                                                            | 50                                                                                        |
| Total                                                                 | 100                                                                                       |
| <b>12. Learning and Teaching Resources</b>                            |                                                                                           |
| Required textbooks (curricular books, if any)                         | Surveying (A.Bannister & S.Raymond)                                                       |
| Main references (sources)                                             | Surveying by ( S.K.Hussin and M.SNagaraj )<br>المساحة الهندسية - تأليف الدكتور ناجي توفيق |
| Recommended books and references<br>(scientific journals, reports...) | -----                                                                                     |
| Electronic References, Websites                                       |                                                                                           |

## Course Description Form

|                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>1. Course Name:</b>                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Physics and Soil Science                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>2. Course Code:</b>                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| DWRE 225                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>3. Semester / Year:</b>                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Second / 2025–2026                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>4. Description Preparation Date:</b>                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 1/09/2025                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>5. Available Attendance Forms:</b>                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Lectures on theory conducted in the classroom.<br>A practical lecture conducted in the laboratory.                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>6. Number of Credit Hours (Total) / Number of Units (Total)</b>                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 6 hours/ 6 credits                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>7. Course administrator's name (mention all, if more than one name)</b>                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Name: Mohammad Tarik Mahmood, Email: <a href="mailto:m.altaiee@uomosul.edu.iq">m.altaiee@uomosul.edu.iq</a><br>Dr. Abdulazeez Abdulbasit Mohamed<br><a href="mailto:abdulazeez.mohammed@uomosul.edu.iq">abdulazeez.mohammed@uomosul.edu.iq</a><br>Abdulghani khalaf mohammed, <a href="mailto:alrobaai1982@uomosul.edu.iq">alrobaai1982@uomosul.edu.iq</a> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>8. Course Objectives</b>                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Course Objectives</b>                                                                                                                                                                                                                                                                                                                                   | Enabling the student to become familiar with the physical properties of soil.<br>Defining the requests with the mathematical relationships of the block.<br>Introducing students to the properties of green onions in soil.<br>Enable students to know and measure water flow in the soil.<br>Training students to know and measure the permeability and hydraulic conductivity of soil.<br>Giving the student sufficient information regarding the general equations of flow |

|  |                                                                                                    |
|--|----------------------------------------------------------------------------------------------------|
|  | Providing the necessary information to the student according to his specialization in w resources. |
|--|----------------------------------------------------------------------------------------------------|

## 9. Teaching and Learning Strategies

### Strategy

1. Introducing the student to the importance of soil physics and its impact on calculating water consumption and water management
2. Enabling the graduate to learn about the basic issues in design and management of irrigation projects, In the future. This is done by giving theoretical lectures directly to the students and discussing the solutions with the students, Mathematical questions related to the subject also ask students to prepare scientific reports related to the subject, Study and presentation of educational slides related to soil physics and modern methods used in this field, Conducting some scientific visits to natural sites containing the targeted physical phenomena.

## 10. Course Structure

| Week | Hours | Required Learning Outcomes                                                                 | Unit or subject name                     | Learning method | Evaluation method |
|------|-------|--------------------------------------------------------------------------------------------|------------------------------------------|-----------------|-------------------|
| 1    | 6     | Introducing the student to the ABCs of soil physics                                        | Introduction to soil physic              |                 |                   |
| 2    | 6     | Introducing the student to the basic properties of soil physics                            | Soil physical properties                 | A lecture       |                   |
| 3    | 6     | Introducing the student to the mathematical relationships of volume and mass               | Volume and mass relationships            | A lecture       |                   |
| 4    | 6     | Introducing the student to the most important methods of measuring water flow in the soil. | Water flow throw soil                    | A lecture       | Quizze1           |
| 5    | 6     | Introducing the student to methods for measuring soil moisture content                     | Soil water content                       | A lecture       |                   |
| 6    | 6     | Introducing the student to how to calculate potentials in the soil                         | Soil water potential                     | A lecture       |                   |
| 7    | 6     | Introducing the student to how to calculate the soil moisture curve                        | Characteristic soil characteristic curve | A lecture       |                   |
| 8    | 6     | Introducing the student to how to measure water flow to saturated soil                     | Water flow in saturated soil             | A lecture       | Asign.            |
| 9    | 6     | Introducing the student to Darcy's law                                                     | Darcy's law                              | A lecture       | Quizze2           |
| 10   | 6     | Introducing the student to calculating the hydraulic conductivity and permeability of soil | Hydraulic conductivity and permeability  | A lecture       |                   |
| 11   | 6     | Introducing students to calculating water flow in unsaturated soil                         | Water flow in unsaturated soil           | A lecture       |                   |
| 12   | 6     | Introducing students to methods of using general equations of flow                         | General equations of flow                | A lecture       | HW                |
| 13   | 6     | Introducing the student to surface tension and its practical applications                  | Surface tension                          | A lecture       | Mid Exam          |

|    |   |                                                                         |                                           |           |                   |
|----|---|-------------------------------------------------------------------------|-------------------------------------------|-----------|-------------------|
| 14 | 6 | Introducing the student to shear stress and methods of measuring it     | Shear stress                              | A lecture |                   |
| 15 | 6 | Introducing the student to soil sorptivity and methods for measuring it | Soil sorptivity                           | A lecture |                   |
| 16 | 3 |                                                                         | <b>Preparatory week before final Exam</b> |           | <b>final Exam</b> |

### 11. Course Evaluation

| Evaluation type | Degree |
|-----------------|--------|
| 2 quizzes       | 5      |
| 1 homework      | 10     |
| classwork       | 20     |
| Term exam       | 10     |
| Final exam      | 50     |
| Total           | 100    |

### 12. Learning and Teaching Resources

|                                                                    |                                                                                                                                                                                                                             |
|--------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Required textbooks (curricular books, if any)                      | 1– Applied soil physics R.J.Hanks & G.L.Ashcroft<br>2 – Soil physics Hisham M. Hassan                                                                                                                                       |
| Main references (sources)                                          | Fundamentals of Soil Physic( DANIEL HILLEL)                                                                                                                                                                                 |
| Recommended books and references (scientific journals, reports...) | Soil Physics and Hydrology                                                                                                                                                                                                  |
| Electronic References, Websites                                    | <a href="https://www.soils.org/discussion-boards/index.php?%2Fforum%2F82-soil-water-management-conservation%2F=">https://www.soils.org/discussion-boards/index.php?%2Fforum%2F82-soil-water-management-conservation%2F=</a> |

## Course Description Form

|                                                                     |
|---------------------------------------------------------------------|
| 1. Course Name:                                                     |
| English 2                                                           |
| 2. Course Code:                                                     |
| UOM2022                                                             |
| 3. Semester / Year:                                                 |
| Second / 2025–2026                                                  |
| 4. Description Preparation Date:                                    |
| 1/9/2025                                                            |
| 5. Available Attendance Forms:                                      |
| Lectures on theory conducted in the classroom.                      |
| 6. Number of Credit Hours (Total) / Number of Units (Total)         |
| 2 hours/ 2 credits                                                  |
| 7. Course administrator's name (mention all, if more than one name) |
| Name: Dr. Laith Al-Taie, Email: laith.altaie@uomosul.edu.iq         |
| 8. Course Objectives                                                |

|                          |                                                                                                                              |
|--------------------------|------------------------------------------------------------------------------------------------------------------------------|
| <b>Course Objectives</b> | In UOM 2022, initially students will learn how to develop their abilities in reading and writing from academic point of view |
|--------------------------|------------------------------------------------------------------------------------------------------------------------------|

## 9. Teaching and Learning Strategies

|                 |                                                                                                                                                                                                                                     |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Strategy</b> | Understand the fundamentals of academic reading and writing. The student will be able to learn different types of readings and how to write academically and in addition how to write practical English in their professional life. |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## 10. Course Structure

| Week | Hours | Required Learning Outcomes                                                                                 | Unit or subject name      | Learning method                                | Evaluation method |
|------|-------|------------------------------------------------------------------------------------------------------------|---------------------------|------------------------------------------------|-------------------|
| 1    | 2     | Distinguish between dependent, Independent, and Integrated essays                                          | Dependent essays          | Lectures on theory conducted in the classroom. |                   |
| 2    | 2     | Distinguish between dependent, Independent, and Integrated essays                                          | independent essays        | Lectures on theory conducted in the classroom. | Quiz 1            |
| 3    | 2     | Distinguish between dependent, Independent, and Integrated essays                                          | Integrated essays         | Lectures on theory conducted in the classroom. | HW1               |
| 4    | 2     | Find the topic and the thesis statement of short essays                                                    | Topic of thesis           | Lectures on theory conducted in the classroom. |                   |
| 5    | 2     | Find the topic and the thesis statement of short essays                                                    | Topic of short essays     | Lectures on theory conducted in the classroom. |                   |
| 6    | 2     | Identify the main ideas from the introduction paragraph                                                    | Introductory paragraphs   | Lectures on theory conducted in the classroom. |                   |
| 7    | 2     | Identify the main ideas from the body paragraph                                                            | Paragraph body structure  | Lectures on theory conducted in the classroom. |                   |
| 8    |       |                                                                                                            | Mid-term Exam             |                                                | Mid-term Exam     |
| 9    | 2     | Find the supporting details from the introduction paragraph                                                | Class elaboration         | Lectures on theory conducted in the classroom. |                   |
| 10   | 2     | Find the supporting details from the body paragraph                                                        | Urban planning            | Lectures on theory conducted in the classroom. | Quiz No.2         |
| 11   | 2     | Draw an outline to link the ideas, supporting details, and essay topic                                     | Urban planning            | Lectures on theory conducted in the classroom. |                   |
| 12   | 2     | Make notes in response to an essay question to create main ideas, supporting details, and thesis statement | Supplement of main ideas  | Lectures on theory conducted in the classroom. |                   |
| 13   | 2     | Write the introduction paragraph on basis of the thesis statement and main ideas                           | Gathering essay structure | Lectures on theory conducted in the classroom. | HW 2              |

|    |   |                                                                      |                                        |                                                |            |
|----|---|----------------------------------------------------------------------|----------------------------------------|------------------------------------------------|------------|
| 14 | 2 | Build the body paragraphs based on main ideas and supporting details | Structuring essays and paragraphs      | Lectures on theory conducted in the classroom. |            |
| 15 | 2 | Write the introduction paragraph based on the main ideas             | Structuring essays and paragraphs      | Lectures on theory conducted in the classroom. |            |
| 16 | 2 |                                                                      | Preparatory week before the final Exam | Lectures on theory conducted in the classroom. | final Exam |

### 11. Course Evaluation

| Evaluation type | Degree |
|-----------------|--------|
| 2 quizzes       | 10     |
| 2 homework      | 5      |
| Project         | 5      |
| Report          | 10     |
| Midterm         | 20     |
| Final exam      | 50     |
| Total           | 100    |

### 12. Learning and Teaching Resources

|                                                                    |                                                                                                                                                                                                         |
|--------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Required textbooks (curricular books, if any)                      | Philpot, Sarah, and Lesley Curnick. 2011. New Headway Academic Skills: Reading, Writing, and Study Skills. Level 3, Student's Book. Oxford: Oxford University Press                                     |
| Main references (sources)                                          | Philpot, Sarah, and Lesley Curnick. 2011. New Headway Academic Skills: Reading, Writing, and Study Skills. Level 3, Student's Book. Oxford: Oxford University Press                                     |
| Recommended books and references (scientific journals, reports...) | -----                                                                                                                                                                                                   |
| Electronic References, Websites                                    | <a href="https://docs.google.com/document/d/1RsRkpe13v-cdmfaUMILwYSsFypFvAigxd-2z1mfS66E/edit?tab=t.0">https://docs.google.com/document/d/1RsRkpe13v-cdmfaUMILwYSsFypFvAigxd-2z1mfS66E/edit?tab=t.0</a> |

|                      |
|----------------------|
| 1. Course Name:      |
| Baath crimes in Iraq |
| 2. Course Code:      |

|                                                                     |                                                                                                                                                                                                                                                                              |
|---------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| UOM 2050                                                            |                                                                                                                                                                                                                                                                              |
| 3. Semester/Year:                                                   |                                                                                                                                                                                                                                                                              |
| 2 / 2025-2026                                                       |                                                                                                                                                                                                                                                                              |
| 4. Description Preparation Date:                                    |                                                                                                                                                                                                                                                                              |
| 1/9/2025                                                            |                                                                                                                                                                                                                                                                              |
| 5. Available Attendance Forms:                                      |                                                                                                                                                                                                                                                                              |
| Individual group                                                    |                                                                                                                                                                                                                                                                              |
| 6. Number of Credit Hours(Total)/Number of Units(Total)             |                                                                                                                                                                                                                                                                              |
| 2/2                                                                 |                                                                                                                                                                                                                                                                              |
| 7. Course administrator's name (mention all, if more than one name) |                                                                                                                                                                                                                                                                              |
| Name: Marwa mohammed ameen<br>Email: marwa.ameen@uomosul.edu.iq     |                                                                                                                                                                                                                                                                              |
| 8. Course Objectives                                                |                                                                                                                                                                                                                                                                              |
| Course Objectives                                                   | <ul style="list-style-type: none"> <li>• Educating students about the crimes committed by the Baath regime in Iraq.....</li> <li>• Guiding students to familiarize themselves With crimes.....</li> <li>• Educating students about the seriousness of crimes.....</li> </ul> |
| 9. Teaching and Learning Strategies                                 |                                                                                                                                                                                                                                                                              |
| Strategy                                                            | Through the prescribed book                                                                                                                                                                                                                                                  |
| 10. Course Structure                                                |                                                                                                                                                                                                                                                                              |

| Week             | Hours | Required Learning Outcomes | Unit or Subject Name                          | Learning Method               | Evaluation Method |
|------------------|-------|----------------------------|-----------------------------------------------|-------------------------------|-------------------|
| First            | 2     |                            | The concept crimes and their types            | View Sfe minutes contribution | Written a lecture |
| second           | 2     |                            | Types of trinationa crime                     | =                             | =                 |
|                  |       |                            | Political crime                               |                               |                   |
|                  |       |                            | Exam                                          |                               |                   |
| third            | 2     |                            | Sociai                                        | =                             | =                 |
| fourth           | 2     |                            | Crime                                         |                               |                   |
| fifth            | 2     |                            | The crime of suppressing the Shaaban uprising | =                             | =                 |
| sixth            |       |                            | psychological                                 | =                             | =                 |
|                  | 2     |                            | crimes of the baath                           | =                             | =                 |
| Seventh          |       |                            | regime                                        |                               |                   |
| Eighth           | 2     |                            | of disrupting Friday prayers                  | =                             | =                 |
| Ninth            | 2     |                            | Mass grave crimes                             |                               |                   |
| 10 <sup>th</sup> | 2     |                            |                                               | =                             | =                 |

|            |   |  |                                                                               |   |   |
|------------|---|--|-------------------------------------------------------------------------------|---|---|
| Eleven     | 2 |  | Chemical attack on Haiabja                                                    | = | = |
| twelfth    | 2 |  | Use of internationally                                                        | = | = |
| Thirteenth | 2 |  |                                                                               | = | = |
| Fourth     | 2 |  | Exam                                                                          |   |   |
|            |   |  | Environmental crimes of the baath regime in Iraq                              | = | = |
| Fifteenth  | 2 |  | Incidents of cemeteries and genocide committed dy the Baathist regime in Iraq | = | = |

#### 11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports 1.The theoretical exam inside the hall

2.The daily exam

3.Numders of activities within the class

4.Question–answer and exam

5.Monthly exam.... etc

#### 12. Learning and Teaching Resources

|                                                                    |             |
|--------------------------------------------------------------------|-------------|
| Required textbooks(curricular books,<br>if any)                    | Course book |
| Main references (sources)                                          |             |
| Recommended books and references<br>(scientific journals, reports) |             |
| Electronic references, websites                                    |             |

**Third Level**

|                 |
|-----------------|
| 1. Course Name: |
|-----------------|

|                 |
|-----------------|
| 1. Course Name: |
|-----------------|

| Level | Semester | No.                                   | Module Code                        | Module Name in English              | اسم المادة الدراسية            | Language           | SSWL (hr/w) |             |                                |                          |            | Exam hr/sem | SSWL hr/sem | USSWL hr/sem | SWL hr/sem   | ECTS  | Modul e Type | Prerequisite Module(s) Code |              |                             |   |   |    |    |     |      |      |          |  |
|-------|----------|---------------------------------------|------------------------------------|-------------------------------------|--------------------------------|--------------------|-------------|-------------|--------------------------------|--------------------------|------------|-------------|-------------|--------------|--------------|-------|--------------|-----------------------------|--------------|-----------------------------|---|---|----|----|-----|------|------|----------|--|
| 5     |          | 1                                     | DWRE 311                           | Hydraulics                          | هيدروليك                       | English            | 2           |             |                                |                          | 3          |             | 3           | 78           | 47           | 125   | 5.00         | C                           |              |                             |   |   |    |    |     |      |      |          |  |
|       |          | 2                                     | DWRE 312                           | Surface Water Hydrology             | هيدرولوجي المياه السطحية       | Arabic             | 2           |             | 2                              |                          | 1          |             | 3           | 78           | 47           | 125   | 5.00         | C                           |              |                             |   |   |    |    |     |      |      |          |  |
|       |          | 3                                     | DWRE 313                           | Irrigation Principles and Practices | اسس الري و عملياته             | Arabic             | 2           |             |                                | 1                        | 1          |             | 3           | 63           | 37           | 100   | 4.00         | C                           |              |                             |   |   |    |    |     |      |      |          |  |
|       |          | 4                                     | DWRE 314                           | Concrete Design                     | تصميم خرسانة                   | English            | 3           |             |                                |                          | 1          | 2           | 3           | 93           | 82           | 175   | 7.00         | S                           |              |                             |   |   |    |    |     |      |      |          |  |
|       |          | 5                                     | DWRE 315                           | Principles of Soil Mechanics        | مبادئ ميكانيك التربة           | English            | 2           |             |                                |                          |            | 2           | 3           | 108          | 67           | 175   | 7.00         | C                           |              |                             |   |   |    |    |     |      |      |          |  |
|       |          | 6                                     | DWRE 316                           | Statistical Methods in Hydrology    | الطرق الاحصائية في الهيدرولوجي | English            | 2           |             |                                |                          |            |             | 3           | 33           | 17           | 50    | 2.00         | S                           |              |                             |   |   |    |    |     |      |      |          |  |
|       |          |                                       |                                    |                                     |                                | Total Weekly Hours | 29          | 13          | 0                              | 5                        | 2          | 9           | 0           | 18           | 453          | 297   | 750          | 30.00                       |              |                             |   |   |    |    |     |      |      |          |  |
| 6     |          | No.                                   | Module Code                        | Module Name in English              | اسم المادة الدراسية            | Language           | SSWL (hr/w) |             |                                |                          |            | Exam hr/sem | SSWL hr/sem |              | USSWL hr/sem |       | SWL hr/sem   | ECTS                        | Modul e Type | Prerequisite Module(s) Code |   |   |    |    |     |      |      |          |  |
|       |          |                                       |                                    |                                     |                                |                    | Cl (hr/w)   | Lect (hr/w) | Lab (hr/w)                     | Pr (hr/w)                | Tut (hr/w) |             | Semn (hr/w) |              |              |       |              |                             |              |                             |   |   |    |    |     |      |      |          |  |
|       |          |                                       |                                    |                                     |                                |                    | 1           | DWRE 321    | Numerical Analysis             | التحليلات العددية        | English    |             | 3           |              |              |       |              |                             |              |                             | 2 |   | 3  | 78 | 72  | 150  | 6.00 | C        |  |
|       |          |                                       |                                    |                                     |                                |                    | 2           | DWRE 322    | Open Channels                  | القنوات المفتوحة         | English    |             | 2           |              |              |       |              |                             |              |                             |   | 3 | 78 | 47 | 125 | 5.00 | C    | DWRE 311 |  |
|       |          |                                       |                                    |                                     |                                |                    | 3           | DWRE 323    | Groundwater Hydrology          | هيدرولوجي المياه الجوفية | Arabic     |             | 2           |              | 2            |       |              |                             |              |                             | 1 |   | 3  | 78 | 22  | 100  | 4.00 | C        |  |
|       |          |                                       |                                    |                                     |                                |                    | 4           | DWRE 324    | Drainage Engineering           | هندسة الزلزال            | Arabic     |             | 2           |              | 1            |       |              |                             |              |                             | 2 |   | 3  | 78 | 72  | 150  | 6.00 | C        |  |
|       |          |                                       |                                    |                                     |                                |                    | 5           | DWRE 325    | Soil Mechanics and Foundations | ميكانيك التربة والاسس    | English    |             | 2           |              |              |       |              |                             |              |                             | 2 |   | 3  | 93 | 32  | 125  | 5.00 | C        |  |
| 6     | DWRE 326 | Consumptive Use and Water Duty        | الاستهلاك المائي و المقتات المائية | Arabic                              | 2                              |                    |             |             |                                |                          | 3          | 33          | 17          | 50           | 2.00         | C     |              |                             |              |                             |   |   |    |    |     |      |      |          |  |
| 7     | DWRE 327 | Engineering Project Design & Planning | تصميم وتنظيم المشروع الهندسي       | Arabic                              | 1                              |                    |             |             | 1                              |                          | 3          | 33          | 17          | 50           | 2.00         | S     |              |                             |              |                             |   |   |    |    |     |      |      |          |  |
|       |          |                                       |                                    | Total Weekly Hours                  | 30                             | 14                 | 0           | 5           | 1                              | 10                       | 0          | 21          | 471         | 279          | 750          | 30.00 |              |                             |              |                             |   |   |    |    |     |      |      |          |  |

| Hydraulics                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                            |                                     |                  |                   |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|-------------------------------------|------------------|-------------------|
| 2. Course Code:                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                            |                                     |                  |                   |
| DWRE 311                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                            |                                     |                  |                   |
| 3. Semester / Year:                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                            |                                     |                  |                   |
| 2025–2026                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                            |                                     |                  |                   |
| 4. Description Preparation Date:                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                            |                                     |                  |                   |
| 9/11/2025                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                            |                                     |                  |                   |
| 5. Available Attendance Forms:                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                            |                                     |                  |                   |
| Lectures and Tutorials                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                            |                                     |                  |                   |
| 6. Number of Credit Hours (Total) / Number of Units (Total)                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                            |                                     |                  |                   |
| 4 hr/4 credits                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                            |                                     |                  |                   |
| 7. Course administrator's name (mention all, if more than one name)                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                            |                                     |                  |                   |
| Name: Prof. Ahmed Y. Mohammed; Email: <a href="mailto:a.altaee@uomosul.edu.iq">a.altaee@uomosul.edu.iq</a><br>Dr. Talal A. Basheer ; Email: <a href="mailto:t.basheer@uomosul.edu.iq">t.basheer@uomosul.edu.iq</a> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                            |                                     |                  |                   |
| 8. Course Objectives                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                            |                                     |                  |                   |
| Course Objective                                                                                                                                                                                                   | <p>On successful completion of this course students will be able to:</p> <ol style="list-style-type: none"> <li>1. Recognize the common types of flow in pipes (i)</li> <li>2. Apply the basic concepts of sciences and engineering to solve issues associated with the flow in pipes(i)</li> <li>3. Formulate the main parameter to design a model related to flow of water (ii)</li> <li>4. Develop and solve design problems and analyze the data to evaluate the pipes used in supply system (ii).</li> <li>5. Identify and analyze the solution of a problem occurs in flow over a hydraulic structure (i)</li> </ol> |                                                                                            |                                     |                  |                   |
| 9. Teaching and Learning Strategies                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                            |                                     |                  |                   |
| Strategy                                                                                                                                                                                                           | The strategy is to provide theoretical lectures using presentation and question solving in an interactive way with students inside the classroom, as well as tutorials exercises.                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                            |                                     |                  |                   |
| 10. Course Structure                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                            |                                     |                  |                   |
| Week                                                                                                                                                                                                               | Hours                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Required Learning Outcomes                                                                 | Unit or subject name                | Learning method  | Evaluation method |
| 1                                                                                                                                                                                                                  | 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Recognize how to create a model (physical or numerical) and select the relevant variables. | Dimensionless analysis              | Lecture in class | HW & Quiz         |
| 2                                                                                                                                                                                                                  | 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Understand the flow in pipes types and what are their applications                         | Modelling in pipes open channel     | Lecture in class | HW & Quiz         |
| 3                                                                                                                                                                                                                  | 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Understand the flow in pipes types and what are their applications                         | Flow in pipes, general equations    | Lecture in class | HW & Quiz         |
| 4                                                                                                                                                                                                                  | 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Understand the flow in pipes types and what are their applications                         | Laminar and turbulent flow in pipes | Lecture in class | HW & Quiz         |

|    |   |                                                                                                |                                                        |                  |           |
|----|---|------------------------------------------------------------------------------------------------|--------------------------------------------------------|------------------|-----------|
| 5  | 2 | Summarize what is meant by a s<br>in pipes, friction force.                                    | Distribution of veloc<br>shear stress in pipes         | Lecture in class | HW & Quiz |
| 6  | 2 | Understand the flow in pipes and their types and what are their application.                   |                                                        |                  |           |
| 7  | 2 | Understand the flow in pipes<br>types and what are their appl                                  | Flow in rough pipes                                    | Lecture in class | HW & Quiz |
| 8  | 2 | Understand the flow in pipes<br>types and what are their appl                                  | Classification of rd<br>smooth flow in pipe            | Lecture in class | HW & Quiz |
| 9  | 2 | Discuss the usage of non-circular<br>how to deal with them theore                              | Flow in non-circular pi                                | Lecture in class | HW & Quiz |
| 10 | 2 | Describe the different types<br>added to the system of water                                   | Minor losses of the fit<br>in orifice and sypho        | Lecture in class | HW & Quiz |
| 11 | 2 | Define the connection between<br>how to deal with them hydra<br>term of parallel, series and b | Connect pipes in pa<br>series                          | Lecture in class | HW & Quiz |
| 12 | 2 | Define the connection between<br>how to deal with them hydra<br>term of parallel, series and b | Branched channel,<br>with tanks                        | Lecture in class | HW & Quiz |
| 13 | 2 | Identify the basic of designing t<br>of water supply system.                                   | Hardy- cross method t<br>discharge in each<br>networks | Lecture in class | HW & Quiz |
| 14 | 2 | Discuss the various properties a<br>pumps.                                                     | Pumps: introduction, c<br>and efficiency               | Lecture in class | HW & Quiz |
| 15 | 2 | Explain the connection of pu<br>system.                                                        | Pumps in parallel and s                                | Lecture in class | HW & Quiz |

## 11. Course Evaluation

| Evaluation type     | degree |
|---------------------|--------|
| First monthly exam  | 20     |
| Second monthly exam | 20     |
| HW & Quiz           | 10     |
| Final exam          | 50     |
| total               | 100    |

## 12. Learning and Teaching Resources

|                                                                       |                                                                                                         |
|-----------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|
| Required textbooks (curricular books, if any)                         | Vennard, J.K., 1963. Elementary fluid mechanics. edition.                                               |
| Main references (sources)                                             | Rajput, R.K., 2004. <i>A textbook of fluid mechanics hydraulic machines</i> . S. Chand Publishing.      |
| Recommended books and references<br>(scientific journals, reports...) |                                                                                                         |
| Electronic References, Websites                                       | <a href="https://uclouvain.be/en-cours-2023-lbres2104">https://uclouvain.be/en-cours-2023-lbres2104</a> |

## Course Description Form

|                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Course Name :                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Surface water Hydrology                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 2. Course Code:                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| DWRE 312                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 3. Semester / Year:                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| first/ 2025–2026                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 4. Description Preparation Date:                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 1–1–2025                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 5. Available Attendance Forms:                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Theoretical lectures in class                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 6. Number of Credit Hours (Total) / Number of Units (Total)                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 5/5                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 7. Course administrator's name (mention all, if more than one name)                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Name Dr. Saleh Mohammed Saleh , Dr.Rasha M. Sami Fadhil                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Email: <a href="mailto:s.zakaria@uomosul.edu.iq">s.zakaria@uomosul.edu.iq</a> , <a href="mailto:Rasha.fadhil@uomosul.edu.iq">Rasha.fadhil@uomosul.edu.iq</a> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 8. Course Objectives                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Course Objectives                                                                                                                                            | <ul style="list-style-type: none"> <li>The aim of this course is to introduce the students to the area of hydrology. The course will cover the principles of the hydrology focusing on the introduction to the Hydrology, Climate Factors, Precipitation, Abstraction from Precipitation, Stream flow Measurement, Run-Off Hydrograph , and Flood Routing. At the end of the course the students will have good knowledge about the hydrologic events and have the skills to deal with a complete process and analysis of the hydrologic events. This will be achieved through descriptive lectures and supervised tutorials</li> </ul> |
| 9. Teaching and Learning Strategies                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Strategy                                                                                                                                                     | <ul style="list-style-type: none"> <li>The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises in addition lectures, individual &amp; group assignments, and e-learning platforms, while at the same time refining and expanding their critical thinking skills.</li> <li>Exercises involving the use of hydrological vocabulary and components to understand the engineering hydrological processes. The course will be taught in Arabic , and all mandatory assignments have to be submitted within the deadlines to be admitted to the exams.</li> </ul>           |

- This will be achieved through classes, interactive tutorials and by considering some challenging problems to motivate student

## 10. Course Structure

| Week  | Hours | Required Learning Outcomes                                                                                                                                 | Unit or subject name                                                                                                                                                                                                                                                                                                                                      | Learning method               | Evaluation method |
|-------|-------|------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|-------------------|
| 1     | 3     | Knowing the types and Nature of hydrological data and symbols to understand the engineering hydrological processes.                                        | Introduction; syllabus; Definition of hydrology, branch of Hydrology, hydrological cycle, Hydrological Budget Equation • Engineering Hydrology Application, Typical Failure Factors for Hydraulic Installations, Source of Data.                                                                                                                          | Theoretical lecture in class  | HW                |
| 2 - 3 | 6     | hydrological analysis using Climate Factors                                                                                                                | Introduction, Climate Factors, Temperature, Solar Radiation, Evaporation, Humidity, Vapor Pressure, and Wind.                                                                                                                                                                                                                                             | Theoretical lecture in class  | HW                |
| 4-5   | 6     | Estimating of Total solar energy gained, Total solar energy loss, reflection, and dispersion, Estimating Saturation Deficit, Relative Humidity, Wind Speed | Introduction of Precipitation , Forms of Precipitation, Rain, Snow, Drizzle, Glaze, Sleet, Hail, Measurement of precipitation, Types of rain gauge, Errors in rainfall measurement, Precipitation Gage Network, adequacy of rain measurement stations, Preparation of data, Methods for calculating missing information, Test for Consistency of Records, | Theoretical lectures in class | H W & Exam        |
| 6     | 3     | Estimating of the Precipitation, (Arithmetic Mean Method, Thiessen Average Method, Isohyet Line Method).                                                   | Average Precipitation over Area, Arithmetic Mean Method, Thiessen Average Method, Isohyet Line Method, Rainfall Data-show Methods, Accumulated Rainfall, Hyetograph, Rainfall Intensity, Probable Maximum Precipitation, Point Rainfall, Depth- area-duration –Relationship, Depth-Area-Duration,                                                         | Theoretical lectures in class | HW                |

|       |   |                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                          |                               |              |
|-------|---|--------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|--------------|
|       |   |                                                                                                                                                              | Intensity –Duration –<br>Return period relation.                                                                                                                                                                                                                                                                                                                         |                               |              |
| 7-8   | 6 | Knowing the Abstraction and losses from Precipitation from , and Knowing Types of evaporation meters, Class A.<br>Estimating Empirical Evaporation Equations | Abstraction from Precipitation including precipitation, Evaporation, Evaporimeter, Types of evaporation meters, Class A Evaporation Pan, Pan Coefficient, Evaporation Measurement Stations, Empirical Evaporation Equations, Analytical methods for estimating, Types of evaporation meters, reducing evaporation from tanks.                                            | Theoretical lectures in class | Quizzes & HW |
| 9-10  | 6 | Knowing and Estimating the Potential Evapotranspiration. Measurement of Infiltration, Infiltration Capacity Values, Estimating Infiltration Indices.         | Evapotranspiration, Potential Evapotranspiration Equations, Infiltration, Measurement of Infiltration, Infiltration Capacity Values, Infiltration Indices                                                                                                                                                                                                                | Theoretical lectures in class | HW1<br>HW2   |
| 11    | 3 | Knowing the Water stage                                                                                                                                      | Introduction, Stage or Water stage, time curve-Stage , Stream flow measurement, Measurement of velocity, Calibration, Equalization of the current meter device,                                                                                                                                                                                                          | Theoretical lectures in class | Midterm Exam |
| 12    | 3 | Estimate Runoff                                                                                                                                              | Rational Method<br>SCS-CN Method                                                                                                                                                                                                                                                                                                                                         | Theoretical lectures in class | Exam         |
| 13-14 | 6 | Analysis Hydrological problems, Estimating Runoff Hydrograph                                                                                                 | Hydrograph, Over land Flow or Surface Runoff, Inter Flow, Base Flow or Ground Water Flow, Hydrograph component, Factors affecting flood hydrograph, Direct Runoff or Surface Flow (D.R.O. ), Base Flow ( B.F. ) , Base Flow Separation, Effective Rain, Unit Hydrograph, Unit Hydrograph Assumptions, Unit Hydrograph Derivation, Unit Hydrograph for Different Duration | Theoretical lectures in class | HW1<br>HW2   |
| 15    | 3 | Applying the Routing method for hydrological storage and channel.                                                                                            | Flood Routing, Hydrologic Storage                                                                                                                                                                                                                                                                                                                                        | Theoretical lectures in class | HW           |

|  |  |  |                                         |  |  |
|--|--|--|-----------------------------------------|--|--|
|  |  |  | Routing, Hydrologic<br>Channel Routing. |  |  |
|--|--|--|-----------------------------------------|--|--|

### **Laboratory Experiments:**

| <b>Week</b> | <b>Hours</b> | <b>Required Learning Outcomes</b> | <b>Unit or subject name</b>                                                                                                      | <b>Learning method</b> | <b>Evaluation method</b> |
|-------------|--------------|-----------------------------------|----------------------------------------------------------------------------------------------------------------------------------|------------------------|--------------------------|
| 1           | 2            |                                   | A general introduction to surface water hydrology programs, an introduction to the watershed modeling system, and its feed data. | Laboratory Computers   | HW                       |
| 2           | 2            | DEM                               | DEM-Digital maps, creating a digital model of the study area                                                                     | Laboratory Computers   | HW                       |
| 3           | 2            | WMS software                      | Introduction to the hydrological models within the system. How to activate and operate the TR-20 hydrological model.             | Laboratory Computers   | HW                       |
| 4           | 2            | WMS software                      | WMS software - Introduction to hydrological models and how to activate and operate them.                                         | Laboratory Computers   | Exam                     |
| 5           | 2            |                                   | Theoretical and practical exam.                                                                                                  | Laboratory Computers   | Report                   |
| 6           | 2            | Excel software                    | Excel software - Introduction to Excel & Basic Navigation - Formatting Cells and Data Presentation                               | Laboratory Computers   | HW                       |
| 7           | 2            | Excel software                    | Excel software - Formulas and Basic Functions                                                                                    | Laboratory Computers   | HW                       |
| 8           | 2            | Excel software                    | Excel software - Advanced Functions and Data Validation                                                                          | Laboratory Computers   | Exam                     |
| 9           | 2            | Excel software                    | Excel software - Charts and Visual Data Representation                                                                           | Laboratory Computers   | HW                       |
| 10          | 2            | Excel software                    | Excel software - PivotTables and PivotCharts- Data Analysis Tools                                                                | Laboratory Computers   | HW                       |
| 11          | 2            | Excel software                    | Excel software - Macros and Introduction to VBA                                                                                  | Laboratory Computers   | HW                       |

|    |   |                |                                                                                                   |                      |        |
|----|---|----------------|---------------------------------------------------------------------------------------------------|----------------------|--------|
| 12 | 2 | Excel software | Excel software - Solving Engineering Problems in Excel-1                                          | Laboratory Computers | Report |
| 13 | 2 | Excel software | Excel software - Solving Surface Hydrology Problems in Excel-2 (Application Engineering Approach) | Laboratory Computers | HW     |
| 14 | 2 |                | Theoretical and practical exam.                                                                   | Laboratory Computers | Exam   |
| 15 | 2 | Final Exam     |                                                                                                   |                      |        |

### 11. Course Evaluation

| <b>Evaluation type</b> | <b>degree</b> |
|------------------------|---------------|
| Class Work             | 5             |
| Quiz                   | 5             |
| Monthly Exam           | 15            |
| Lab                    | 15            |
| mid                    | 10            |
| Final Exam             | 50            |
|                        |               |
|                        |               |

### 12. Learning and Teaching Resources

|                                                                                                |  |
|------------------------------------------------------------------------------------------------|--|
| Ward, Roy C., and Mark Robinson. Principles of hydrology. Vol. 367. London: McGraw-Hill, 1975. |  |
| Raghunath, H. M. (2006). Hydrology: principles, analysis and design. New Age International.    |  |

## Course Description Form

|                                                                                                                                       |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                  |                        |                          |
|---------------------------------------------------------------------------------------------------------------------------------------|--------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|------------------------|--------------------------|
| 1. Course Name:                                                                                                                       |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                  |                        |                          |
| Irrigation principles and practices                                                                                                   |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                  |                        |                          |
| 2. Course Code:                                                                                                                       |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                  |                        |                          |
| DWRE 313                                                                                                                              |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                  |                        |                          |
| 3. Semester / Year:                                                                                                                   |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                  |                        |                          |
| First Semester/2025–2026                                                                                                              |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                  |                        |                          |
| 4. Description Preparation Date:                                                                                                      |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                  |                        |                          |
| 1/9/2025                                                                                                                              |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                  |                        |                          |
| 5. Available Attendance Forms:                                                                                                        |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                  |                        |                          |
| Theoretical lectures in class                                                                                                         |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                  |                        |                          |
| 6. Number of Credit Hours (Total) / Number of Units (Total)                                                                           |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                  |                        |                          |
| 4hour*15 week/4 units                                                                                                                 |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                  |                        |                          |
| 7. Course administrator's name (mention all, if more than one name)                                                                   |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                  |                        |                          |
| Dr. Anmar Abdulaziz AL-Talib    anmar.altalib@uomosul.edu.iq<br>Alaa ismail naser                      engalaaismail79@uomosul.edu.iq |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                  |                        |                          |
| 8. Course Objectives                                                                                                                  |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                  |                        |                          |
| <b>Course Objectives</b>                                                                                                              |              | The course aims to introduce the student to the principles and foundations of irrigation, its operations, methods, and matters related to it                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                  |                        |                          |
| 9. Teaching and Learning Strategies                                                                                                   |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                  |                        |                          |
| <b>Strategy</b>                                                                                                                       |              | The course Irrigation principles and practices teaches students many useful things in the future in designing and understanding the basic principles of irrigation.<br>After completing this course, students are expected to be familiar with the following points:<br>1. Definition of irrigation, its purpose and benefits.<br>2. Identify and store irrigation sources.<br>3. Basic relationships between soil and water.<br>4. Safe drainage from groundwater reservoirs.<br>5. The feasibility of developing underground reservoirs and the changes that occur in them.<br>6. Learn about ground moisture measurements and how to calculate the amounts of water stored in the soil.<br>7. Identify the characteristics of water entering the soil. |                                                  |                        |                          |
| 10. Course Structure                                                                                                                  |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                  |                        |                          |
| <b>Week</b>                                                                                                                           | <b>Hours</b> | <b>Required Learning Outcomes</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <b>Unit or subject name</b>                      | <b>Learning method</b> | <b>Evaluation method</b> |
| 1                                                                                                                                     | 4            | Irrigation in the world - irrigation since ancient times - dry areas in the world - definition of irrigation - precipitation - flood water - ground water                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Introducing the student to irrigation in general | Lecture                |                          |

|     |   |                                                                                                                                                                                                                                                                                                                                                                                             |                                                  |         |                          |
|-----|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|---------|--------------------------|
| 2-3 | 8 | Fields of irrigation science<br>- Irrigation economics<br>- Falling on valleys<br>– Water resource studies<br>– Surveying operations in snowy areas and their benefits<br>– Surface tanks                                                                                                                                                                                                   | The future of growth and expansion in irrigation | Lecture | H.W(1) and Daily exam(1) |
| 4-5 | 8 | Small dams sedimentation (accumulation of sediments) in reservoirs - reduction of evaporation losses<br>- problems of aquatic (aquatic plants) - industrial rain or sowing of clouds - development of river pumping<br>Transferring saline water to fresh water - Importance of ground water (groundwater) - Feeding or recharging aquifers - Safe disposal of underground irrigation tanks | rrigation water sources and storage              | Lecture | H.W(2)and Dailyexam(2)   |
| 6   | 4 | Monthly exam(1)                                                                                                                                                                                                                                                                                                                                                                             |                                                  |         |                          |
| 7-8 | 8 | Soil and soil basic relationships - soil texture - soil structure (soil construction) - specific gravity (real weight) - specific weight                                                                                                                                                                                                                                                    | The basic relationships between soil and water   | Lecture | H.W(3)and Daily exam(3)  |

|       |   |                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                |         |                          |
|-------|---|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|---------|--------------------------|
|       |   | Pore space - leaching<br>- soil water input -<br>permeability - soil<br>depth - plant food<br>compounds - soluble<br>excess salts                                                                                                                                                                                                                                                                                                                          |                                                |         |                          |
| 9-10  | 8 | Surface tension - Tensile stresses (tension compressors) - Soil moisture stress - Soil moisture content - Soil water classification and availability (availability) Fill the available ground water tank - the natural properties represented by the soil                                                                                                                                                                                                  | The basic relationships between soil and water | lecture | H.W(4)                   |
| 11    | 4 | Monthly exam(2)                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                |         |                          |
| 12    | 4 | Determination of moisture content of soil by weight method - Exploitation of electrical properties of porous mold - Tensometers - Neutron method for soil moisture measurement - Thermal properties - Error in sample                                                                                                                                                                                                                                      | Measuring soil moisture                        | lecture | H.W(5)                   |
| 13-14 | 8 | Flow of water in and through soil - Energy in flowing water - Bases to measure pressure energies in saturated soil - Measuring soil permeability Characteristics of soil water input (absorption) - Constant pressure permeability meter - Variable pressure permeability meter - Input rate measurement (soil absorption of water) - Precipitation and movement of soil water during irrigation - Asymmetric and non-homogeneous soil in all directions . | The flow of water into and through the soil    | lecture | H.W(6) and Daily exam(4) |
| 15    | 4 | Monthly exam(3)                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                |         |                          |

### 11. Course Evaluation

| Evaluation type | Degree |
|-----------------|--------|
| Quizzes         | 10%    |
| Home works      | 5%     |
| Term exam       | 25%    |

|                                                                    |                                                                                                                                                                                                                                                                                   |
|--------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Final exam                                                         | 60%                                                                                                                                                                                                                                                                               |
| Total                                                              | 100%                                                                                                                                                                                                                                                                              |
| <b>12. Learning and Teaching Resources</b>                         |                                                                                                                                                                                                                                                                                   |
| Required textbooks (curricular books any)                          | <ul style="list-style-type: none"> <li>Irrigation principles and practices, by V.E. Hansen ,O.W.Israelsenand G.F. Stringham, fourth edition, john wiley and sons., 1980.</li> </ul>                                                                                               |
| Main references (sources)                                          | <ul style="list-style-type: none"> <li>Crop water requirements (FAO – 24</li> <li>-Crop evapotranspiration –guide lines for computing crop water requirements (FAO –56)</li> <li>Design manual for irrigation &amp;drainage- ministry of irrigation-Iraq (pencol),1980</li> </ul> |
| Recommended books and references (scientific journals, reports...) | -----                                                                                                                                                                                                                                                                             |
| Electronic References, Websites                                    | <a href="https://classroom.google.com/c/ODA3MzgWMDY4MjYw">https://classroom.google.com/c/ODA3MzgWMDY4MjYw</a>                                                                                                                                                                     |

## Course Description Form

|                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|----------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>1. Course Name:</b>                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Concrete Design                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>2. Course Code:</b>                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| DWRE 314                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>3. Semester / Year:</b>                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| 1/2025–2026                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>4. Description Preparation Date:</b>                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| 19/10/2025                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>5. Available Attendance Forms:</b>                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Theoretical lectures in class                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>6. Number of Credit Hours (Total) / Number of Units (Total)</b>         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| 2/2                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>7. Course administrator's name (mention all, if more than one name)</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Name: Ass. Prof. Dr. Saddam M. AHMED<br>Email: ahmed.saddam@uomosul.edu.iq |                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>8. Course Objectives</b>                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Course Objectives</b>                                                   | In DWRE 314, initially students will learn how to analysis and design reinforced concrete elements. Upon successful completion of this course the student shall be able to assess the:<br>1.Mechanical properties of concrete, and reinforcements, (ii)<br>2.Safety and serviceability provision, (ii)<br>3.Behavior of reinforced concrete at working and ultimate loads, (ii)<br>4.Analysis and Design of simple beams and slabs by working stress method, (ii) |

|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|--|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | 5. Analysis and Design of simple beams and slabs by ultimate strength design method, (ii)<br>6. Analysis and design of T beam, Doubly reinforced beam and continuous beams by Ultimate strength design method (USD), (ii)<br>7. Shear strength in beams and design of shear reinforcement, (ii)<br>8. Mechanical properties of Shear strength in beams and design of shear reinforcement, (ii)<br>9. Behavior of reinforced concrete columns, (ii)<br>10. Analysis and Design of short columns, (ii)<br>11. Analysis and Design of flat slab, (ii)<br>12. Analysis and design of flat slab with drop panels, (ii)<br>13. Analysis and design of Two-way slab and beams, (ii)<br>14. Procurement for seismic resistance moment frames, (ii)<br>15. Use computer software to Design and analysis different types of structures (ii). |
|--|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## 9. Teaching and Learning Strategies

|                 |                                                                                                                                                                                                                                                                                                                                          |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Strategy</b> | The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering some challenging problems to motivate students. |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## 10. Course Structure

| Week | Hours | Required Learning Outcomes | Unit or subject name                                                                                                                                                                                          | Learning method               | Evaluation method |
|------|-------|----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|-------------------|
| 1    | 4     | ii                         | Introduction; syllabus; Advantages and Disadvantages of Reinforced Concrete as a Structural Material; Mechanical properties of concrete; steel. Concrete and steel grading; design philosophy; Loading types. | Theoretical lectures in class | Exam1             |
| 1-2  | 2     | ii                         | Introduction, Flexural Analysis of Beams (working): Cracking Moment; Elastic Stresses—Concrete Cracked                                                                                                        | Theoretical lectures in class | H.W1              |
| 2-3  | 6     | ii                         | Introduction, Flexural Analysis of Beams (Ultimate): Ultimate Moment; Yield Stresses                                                                                                                          | Theoretical lectures in class | Exam2             |
| 3-4  | 6     | ii                         | Strength Analysis of Beams According to ACI Code: Design Methods; Strains in Flexural Members; Balanced Sections, Tension-Controlled Sections, and Compression-Controlled                                     | Theoretical lectures in class | ClassW1           |
| 4-5  | 6     | ii                         | Design of Rectangular Beams and One-Way Slabs: Load Factors; Design of Rectangular Beams; One-Way Slabs                                                                                                       | Theoretical lectures in class | Exam3             |
| 5-6  | 6     | ii                         | Analysis and Design of T Beams and Doubly Reinforced Beams: T Beams; Design of Doubly Reinforced Beams (positive and Negative Moment design);<br>L-Shaped Beams                                               | Theoretical lectures in class | H.W2              |
| 7    | 3     | ii                         | Shear and Diagonal Tension: Shear Stresses in Concrete Beams; Design for Shear.                                                                                                                               | Theoretical lectures in class | ClassW2           |

|    |   |    |                                                                                                                                       |                               |         |
|----|---|----|---------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|---------|
| 7  | 3 | ii | Introduction; syllabus; Advantages main and secondary reinforcements; steel and concrete shear resistance.                            | Theoretical lectures in class | Exam4   |
| 8  | 6 | ii | Introduction to columns, Flexural Analysis of short columns (under axial loads), Load carrying capacity of short columns, ties design | Theoretical lectures in class | H.W3    |
| 9  | 6 | ii | Short column under axial and bending actions, Interaction diagram (m-p curves).                                                       | Theoretical lectures in class | Exam5   |
| 10 | 6 | ii | Design of short columns subjected to bending and axial loads according to ACI Code: Design Methods.                                   | Theoretical lectures in class | ClassW3 |
| 11 | 6 | ii | Design of flat slab: Load Factors, shear check                                                                                        | Theoretical lectures in class | Exam6   |
| 12 | 6 | ii | Design of flat slab with drop panels.                                                                                                 | Theoretical lectures in class | H.W4    |
| 13 | 6 | ii | Design of Rectangular Beams and two-Way Slabs, Shear check.                                                                           | Theoretical lectures in class | ClassW4 |
| 14 | 6 | ii | Use computer software to Design and analysis different types of structures                                                            | Theoretical                   | Project |

## 11. Course Evaluation

| Evaluation type        | Degree |
|------------------------|--------|
| Six Exams, (each 4pt)  | 24pt   |
| Four H.W. (each 2pt)   | 8pt    |
| Four ClassW (each 1pt) | 4pt    |
| Midterm Exam           | 10pt   |
| Project                | 4 pt   |
| Final Exam             | 50pt   |
| Total                  | 100pt  |

## 12. Learning and Teaching Resources

|                                                                    |                                                                                                                                                                                                                |
|--------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Required textbooks (curricular books, if any)                      | <ul style="list-style-type: none"> <li>Jack M., Russell B. (2012) "DESIGN OF REINFORCED CONCRETE", nine Edition, Wiley, ISBN: 978-1-118-12984-5, USA. (can be downloaded from the Course web page).</li> </ul> |
| Main references (sources)                                          | <ul style="list-style-type: none"> <li>Gillesania, D.I.T. "FUNDAMENTALS OF CONCRETE DESIGN". Phils. DIT Gillesania, 2003. (can be downloaded from the Course web page).</li> </ul>                             |
| Recommended books and references (scientific journals, reports...) | -----                                                                                                                                                                                                          |
| Electronic References, Websites                                    | -----                                                                                                                                                                                                          |

## Course Description Form

|                                                                           |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                             |                        |                          |
|---------------------------------------------------------------------------|--------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|------------------------|--------------------------|
| 1. Course Name:                                                           |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                             |                        |                          |
| Principles of Soil Mechanics                                              |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                             |                        |                          |
| 2. Course Code:                                                           |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                             |                        |                          |
| DWRE315                                                                   |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                             |                        |                          |
| 3. Semester / Year:                                                       |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                             |                        |                          |
| Fall semester (first) / 2025 -2026                                        |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                             |                        |                          |
| 4. Description Preparation Date:                                          |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                             |                        |                          |
| 2025/10/15                                                                |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                             |                        |                          |
| 5. Available Attendance Forms:                                            |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                             |                        |                          |
| Class lectures + Lab. lectures                                            |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                             |                        |                          |
| 6. Number of Credit Hours (Total) / Number of Units (Total)               |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                             |                        |                          |
| 7/105                                                                     |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                             |                        |                          |
| 7. Course administrator's name (mention all, if more than one name)       |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                             |                        |                          |
| Name: Zuheir Karabash                      Email: karabash@uomosul.edu.iq |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                             |                        |                          |
| 8. Course Objectives                                                      |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                             |                        |                          |
| <b>Course Objectives</b>                                                  |              | The objective of the principle of soil mechanics course is to introduce the subject of geotechnical engineering. In this course, the student will understand and be familiar with important topics: type of the soils and their origins, index, and physical and engineering properties of soils, soil structure and grain size, classifications of soils for engineering purposes, permeability of the soil and seepage through the soil, soil stresses, compressibility, and consolidation. Upon completion of the principle of soil mechanics course, students should be able to apply principles of soil mechanics in the analysis, design, and construction of civil engineering projects. This course covers the GOs (i and iii) |                             |                        |                          |
| 9. Teaching and Learning Strategies                                       |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                             |                        |                          |
| <b>Strategy</b>                                                           |              | The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials, and by considering some challenging problems to motivate students.                                                                                                                                                                                                                                                                                                                                                                                              |                             |                        |                          |
| 10. Course Structure                                                      |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                             |                        |                          |
| <b>Week</b>                                                               | <b>Hours</b> | <b>Required Learning Outcomes</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <b>Unit or subject name</b> | <b>Learning method</b> | <b>Evaluation method</b> |

|                |           |                                                     |                                                                                                                                   |                  |                                  |
|----------------|-----------|-----------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|------------------|----------------------------------|
| 1              | 7         | Definition of the soil types and origin             | Introduction, types of soil, soil origin, and formation.                                                                          | Lecture in class | Class discussions                |
| 2              | 7         | Explaining the physical properties of the soil      | Physical properties of the soil, weight-volume relationships soil structures.                                                     | Lecture in class | Quiz                             |
|                |           | Learn the soil water content and Gs determination   | Lecture and Water content and GS tests                                                                                            | In Lab.          | Report                           |
| 3              | 7         | Knowing the soil consistency and Atterberg's limits | Soil plasticity and Atterberg limits, clay mineralogy.                                                                            | Lecture in class | Quiz                             |
|                |           | Learn Atterberg's limits tests                      | Lecture, Atterberg's limits                                                                                                       | In Lab.          | Report                           |
| 4              | 7         | Learn the soil classification systems               | Soil classification.                                                                                                              | Lecture in class | Class discussions                |
|                |           | Learn how to estimate soil grain size distributions | Lecture and grain size distribution tests.                                                                                        | In Lab.          | Report                           |
| 5              | 7         | Learn the permeability of the soil                  | Permeability of soils, Darcy's law, and soil coefficient of permeability.                                                         | Lecture in class | Course examination No.1          |
|                |           | Learn about the permeability tests                  | Lecture and permeability test                                                                                                     | In Lab.          | Report                           |
| 6+7+8          | 7+7+7     | Knowledge of seepage of water through soils         | Seepage of the water through the earth dams.                                                                                      | Lecture in class | Quiz and Course Examination No.2 |
| 9+10           | 7+7       | Knowledge stresses in the soil                      | Total and effective stresses and stresses due to external loads.                                                                  | Lecture in class | Homework assignment              |
| 11+12+13+14+15 | 7+7+7+7+7 | Knowing the consolidation theories and mechanisms   | Consolidation, mechanism of consolidation, consolidation test, and data analysis, and presentation of consolidation test results. | Lecture in class | Quiz                             |
|                |           | Learn the consolidation test                        | Lecture and consolidation test.                                                                                                   | In Lab.          | Report                           |

## 11. Course Evaluation

| Evaluation type                  | degree |
|----------------------------------|--------|
| Homework, classwork, reports (6) | 2      |
| Quizzes (2)                      | 5      |
| Term exam (2)                    | 28     |
| Laboratory, experimental part    | 15     |
| Final exam                       | 50     |
| Total                            | 100    |

## 12. Learning and Teaching Resources

|                                                                    |                                                                                                                                                                                                                                                                                                                                                                                               |
|--------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Required textbooks (curricular books, if any)                      | <ul style="list-style-type: none"> <li>o Al-Asho, M. O “Soil Mechanics Principles”, 1990 Student textbook, University of Mosul.</li> </ul>                                                                                                                                                                                                                                                    |
| Main references (sources)                                          | <ul style="list-style-type: none"> <li>o - Das, B.M. and Sobhan, K. “Principle of Geotechnical Engineering”, ninth Edition, Cengage Learning.</li> <li>o Coduto, D.P. “ Geotechnical Engineering Principles and Practices”, 1999, Prentice-Hall, Inc.</li> </ul>                                                                                                                              |
| Recommended books and references (scientific journals, reports...) | <ol style="list-style-type: none"> <li>1. Al-Rafidain Engineering Journal.</li> <li>2. Highway Research Record, H R R.</li> <li>3. Journal of the Geotechnical Engineering Division, ASCE.</li> <li>4. Journal of Soil Mechanics and Foundation Division, Proc. ASCE.</li> <li>5. Transportation Research Record, TRR.</li> </ol> <p>Journal of the Japan Society of C Engineering, JSCE.</p> |
| Electronic References, Websites                                    | None                                                                                                                                                                                                                                                                                                                                                                                          |

## Course Description Form

|                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Course Name:                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Statistical Methods in Hydrology                                        |                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 2. Course Code:                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                               |
| DWRE 316                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 3. Semester / Year:                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                               |
| First / 2025-2026                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 4. Description Preparation Date:                                        |                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 1/9/2023                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 5. Available Attendance Forms:                                          |                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Theoretical lectures in class.                                          |                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 6. Number of Credit Hours (Total) / Number of Units (Total)             |                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 2/2                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 7. Course administrator's name (mention all, if more than one name)     |                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Name: Dr. Muhanad Talal Yousif<br>Email: mohanad_alsheer@uomosul.edu.iq |                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 8. Course Objectives                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Course Objectives</b>                                                | <ul style="list-style-type: none"> <li>Analysis of hydrological data</li> <li>Representation and graphical of hydrological data</li> <li>Used the descriptive statistics for hydrological data</li> <li>Understand the meaning of probability theory</li> <li>Application the regression analysis and correlation on hydrological data</li> </ul>                                                                             |
| 9. Teaching and Learning Strategies                                     |                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Strategy</b>                                                         | <p>The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, by considering type of exercises involving some problems that are interesting to the students in mathematics scope in a field of dams and water resources engineering.</p> |

## 10. Course Structure

| Week  | Hours | Required Learning Outcomes                                                       | Unit or subject name                                                                                                                                                               | Learning method    | Evaluation method |
|-------|-------|----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|-------------------|
| 1-3   | 6     | Analysis of hydrological data                                                    | Introduction to statistical Hydrology; Definitions and Scope; Need of Statistical Methods; Hydrologic Processes; Hydrologic Variables                                              | A lecture in class | H.W, C.W and Exam |
| 4-6   | 6     | Analysis of hydrological data, Representation and graphical of hydrological data | Graphical Representation Hydrologic Data; Dot Diagram; Histogram; Frequency Polygon                                                                                                | A lecture in class | H.W, C.W and Exam |
| 7-9   | 6     | Analysis of hydrological data, Representation and graphical of hydrological data | Cumulative Relative Frequency Diagram; Duration Curves; Bar Chart                                                                                                                  | A lecture in class | H.W, C.W and Exam |
| 10-12 | 6     | the descriptive statistics for hydrological data                                 | Numerical Summaries and Descriptive Statistics; Measures of Central Tendency; Mean; Median; Mode; Measures of Dispersion; Mean Absolute Deviation; Standard Deviation and variance | A lecture in class | H.W, C.W and Exam |
| 13-15 | 6     | Application the regression analysis and correlation on hydrological data         | Regression Analysis; Simple Linear Regression (SLR) and Curvilinear Regression; Model Transformable to Linear Regression, Correlation and Coefficient of Determination             | A lecture in class | H.W, C.W and Exam |

| 11. Course Evaluation                                              |                                                                                                                                                                                                                                                                                                   |
|--------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Evaluation type                                                    | Degree                                                                                                                                                                                                                                                                                            |
| 3 Exam                                                             | 30                                                                                                                                                                                                                                                                                                |
| 3 homework                                                         | 6                                                                                                                                                                                                                                                                                                 |
| 2 classwork                                                        | 4                                                                                                                                                                                                                                                                                                 |
| Final exam                                                         | 60                                                                                                                                                                                                                                                                                                |
| Total                                                              | 100                                                                                                                                                                                                                                                                                               |
| 12. Learning and Teaching Resources                                |                                                                                                                                                                                                                                                                                                   |
| Required textbooks (curricular books, if any)                      | <p>“Statistical Analysis of Hydrologic Variables”. Ramesh S.V. Teegavarapu, Jose D. Salas and Jery R. Stedinger. Published by the American Society of Civil Engineers, 2019</p>                                                                                                                   |
| Main references (sources)                                          | <ul style="list-style-type: none"> <li>• “Statistical Methods in Hydrology and Hydroclimatology”. Rajib Maity. Springer Transactions in Civil and Environmental Engineering. 2018</li> <li>• “Hydrologic Probability and Statistics”. Joseph V. Bellini. PDH online Course H142. 2012.</li> </ul> |
| Recommended books and references (scientific journals, reports...) | _____                                                                                                                                                                                                                                                                                             |
| Electronic References, Websites                                    | _____                                                                                                                                                                                                                                                                                             |

## Course Description Form

1. Course Name:

| Numerical Analysis                                                  |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                           |                               |                   |
|---------------------------------------------------------------------|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|-------------------------------|-------------------|
| 2. Course Code:                                                     |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                           |                               |                   |
| DWRE 321                                                            |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                           |                               |                   |
| 3. Semester / Year:                                                 |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                           |                               |                   |
| 2/2025–2026                                                         |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                           |                               |                   |
| 4. Description Preparation Date:                                    |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                           |                               |                   |
| 1/9/2025                                                            |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                           |                               |                   |
| 5. Available Attendance Forms:                                      |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                           |                               |                   |
| Theoretical lectures in class                                       |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                           |                               |                   |
| 6. Number of Credit Hours (Total) / Number of Units (Total)         |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                           |                               |                   |
| 2/3                                                                 |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                           |                               |                   |
| 7. Course administrator's name (mention all, if more than one name) |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                           |                               |                   |
| Name: Ali Ahmed Abdulhadi Email: aliabdulmawjood@uomosul.edu.iq     |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                           |                               |                   |
| 8. Course Objectives                                                |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                           |                               |                   |
| Course Objectives                                                   |       | <p>The primary aims of this course are to:</p> <ul style="list-style-type: none"> <li>Familiarize students with numerical methods for solving complex mathematical problems, including numerical integration, differentiation, and the solutions of differential equations.</li> <li>Equip students with the skills necessary to obtain accurate numerical solutions to mathematical problems that cannot be solved analytically. Students will develop the ability to analyze and minimize errors and approximations inherent in these methods</li> <li>Educate students about common sources of error and approximation in numerical methods, including truncation error, rounding error, and discretization error.</li> <li>Provide students with mastery over the techniques for solving equations in one variable, including the bisection method, secant method, Newton-Raphson method, and fixed-point iteration method. After taking the course.</li> <li>Allow students to develop a deep understanding of the available methods for solving simultaneous equations</li> </ul> |                                           |                               |                   |
| 9. Teaching and Learning Strategies                                 |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                           |                               |                   |
| Strategy                                                            |       | The main strategy that will be adopted in delivering this module is to encourage student participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes and interactive tutorials                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                           |                               |                   |
| 10. Course Structure                                                |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                           |                               |                   |
| Week                                                                | Hours | Required Learning Outcomes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Unit or subject name                      | Learning method               | Evaluation method |
| 1                                                                   | 3     | Numerical Methods: Iteration and graphical method                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Numerical Solution of Algebraic Equations | Theoretical lectures in class | HW & Exam         |
| 2                                                                   | 3     | Bisection method                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Numerical Solution Algebraic Equations    |                               | HW & Exam         |
| 3                                                                   | 3     | False position method                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Numerical Solution Algebraic Equations    | Theoretical lectures in class | HW & Exam         |
| 4                                                                   | 3     | Newton-Raphson's method                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Numerical Solution Algebraic Equations    | Theoretical lectures in class | HW & Exam         |

|       |    |                                                    |                  |                               |           |
|-------|----|----------------------------------------------------|------------------|-------------------------------|-----------|
| 5     | 3  | Maclaurin series                                   | Numerical Series | Theoretical lectures in class | HW & Exam |
| 6-9   | 12 | Taylor's series                                    | Numerical Series | Theoretical lectures in class | HW & Exam |
| 10    | 3  | Euler's method                                     | Numerical Series |                               | HW & Exam |
| 11    | 3  | Runge's -Kutta method                              | Solution of D.E. | Theoretical lectures in class | HW & Exam |
| 12-13 | 6  | Interpolation:Greagory Newton interpolation method | Interpolation    | Theoretical lectures in class | HW & Exam |
| 14    | 3  | exam                                               |                  |                               |           |
| 15    | 3  | Preparatory week before the final Exam             |                  |                               |           |

## 11. Course Evaluation

| Evaluation type | degree |
|-----------------|--------|
| 2 quizzes       | 12     |
| 2 homework      | 8      |
| Term exam       | 20     |
| Final exam      | 60     |
| Total           | 100    |
|                 |        |

## 12. Learning and Teaching Resources

|                                                                    |                                                                                                                                            |
|--------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| Required textbooks (curricular books, if any)                      | -----                                                                                                                                      |
| Main references (sources)                                          | <ul style="list-style-type: none"> <li>Burden_Numerical_Analysis_5e_(PWS,_1993)</li> </ul> Fundamental Numerical Methods and Data Analysis |
| Recommended books and references (scientific journals, reports...) | -----                                                                                                                                      |
| Electronic References, Websites                                    | -----                                                                                                                                      |

## Course Description Form

1. Course Name:

open channels

2. Course Code:

DWRE 322

3. Semester / Year:

2025–2026

4. Description Preparation Date:

1/2/2026

5. Available Attendance Forms:

Lectures and Tutorials

6. Number of Credit Hours (Total) / Number of Units (Total)

5 hr/5 credits

7. Course administrator's name (mention all, if more than one name)

Name: Ahmed Y. Mohammed

Email: a.altaee@uomosul.edu.iq

8. Course Objectives

**Course Objectives**

On successful completion of this course students will be able to:

6. Recognize the common physical phenomenon of flow in open channel
7. Classify the type of flow and the properties for each type, with the common empirical equations
8. Define the specific energy of the flow in open channel and connect that with practical cases that happen in reality
9. Route the curve of surface water profile when there is a structure in open channel

9. Teaching and Learning Strategies

**Strategy**

The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills.

This will be achieved through classes, interactive tutorials, class works and by considering typical simple experiments involving some sampling activities that are interesting to the students.

10. Course Structure

| Week | Hours | Required Learning Outcomes                 | Unit or subject name                       | Learning method              | Evaluation method |
|------|-------|--------------------------------------------|--------------------------------------------|------------------------------|-------------------|
| 1    | 2     | Open channel, types and classifications.   | Open channel, types and classifications    | Presentation And white board | Monthly exam      |
| 2    | 2     | Uniform flow, Chezy and Manning equations. | Uniform flow, Chezy and Manning equations. | Presentation And white board | Monthly exam      |
| 3    | 2     | Best hydraulic cross section               | Best hydraulic cross section               | Presentation And white board | Monthly exam      |

|                                                                    |   |                                                          |                                                                                                         |                              |              |
|--------------------------------------------------------------------|---|----------------------------------------------------------|---------------------------------------------------------------------------------------------------------|------------------------------|--------------|
| 4&5                                                                | 4 | Consecration of hydraulic radius and Manning coefficient | Consecration hydraulic radius and Manning coefficient                                                   | Presentation And white board | Monthly exam |
| 6                                                                  | 2 | Specific energy and critical depth                       | Specific energy critical depth.                                                                         | Presentation And white board | Monthly Exam |
| 7                                                                  | 2 | First monthly exam                                       |                                                                                                         |                              |              |
| 8&9                                                                | 4 | Critical depth with hydraulic contractions               | Critical depth with or contractions                                                                     | Presentation And white board | Monthly Exam |
| 10                                                                 | 2 | Hydraulic jump                                           | Hydraulic jump                                                                                          | white board                  | Monthly Exam |
| 11                                                                 | 2 | Varied flow                                              | Varied flow                                                                                             | white board                  | Monthly Exam |
| 12                                                                 | 2 | water surface profile                                    | water surface profile                                                                                   | white board                  | Monthly Exam |
| 13                                                                 | 2 | Weirs and notches                                        | Weirs and notches                                                                                       | white board                  | Monthly Exam |
| 14                                                                 | 2 | Second monthly exam                                      |                                                                                                         |                              |              |
| 15                                                                 | 2 | Preparatory week before the final Exam                   |                                                                                                         |                              |              |
| 11. Course Evaluation                                              |   |                                                          |                                                                                                         |                              |              |
| Evaluation type                                                    |   |                                                          | degree                                                                                                  |                              |              |
| Quizzes                                                            |   |                                                          | 10                                                                                                      |                              |              |
| Assignments                                                        |   |                                                          | 10                                                                                                      |                              |              |
| monthly exam                                                       |   |                                                          | 15                                                                                                      |                              |              |
| Mid-term exam                                                      |   |                                                          | 15                                                                                                      |                              |              |
| Final exam                                                         |   |                                                          | 50                                                                                                      |                              |              |
| total                                                              |   |                                                          | 100                                                                                                     |                              |              |
| 12. Learning and Teaching Resources                                |   |                                                          |                                                                                                         |                              |              |
| Required textbooks (curricular books, if any)                      |   |                                                          | Vennard, J.K., 1963. Elementary fluid mechanics. 6th edition.                                           |                              |              |
| Main references (sources)                                          |   |                                                          | Rajput, R.K., 2004. A textbook of fluid mechanics and hydraulic machines. S. Chand Publishing.          |                              |              |
| Recommended books and references (scientific journals, reports...) |   |                                                          |                                                                                                         |                              |              |
| Electronic References, Websites                                    |   |                                                          | <a href="https://uclouvain.be/en-cours-2023-lbres2104">https://uclouvain.be/en-cours-2023-lbres2104</a> |                              |              |

## Course Description Form

1. Course Name:

|                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                              |                                                 |                               |                   |
|---------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|-------------------------------|-------------------|
| Groundwater Hydrology                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                              |                                                 |                               |                   |
| 2. Course Code:                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                              |                                                 |                               |                   |
| DWR 323                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                              |                                                 |                               |                   |
| 3. Semester / Year:                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                              |                                                 |                               |                   |
| 2/2025–2026                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                              |                                                 |                               |                   |
| 4. Description Preparation Date:                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                              |                                                 |                               |                   |
| 1/9/2025                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                              |                                                 |                               |                   |
| 5. Available Attendance Forms:                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                              |                                                 |                               |                   |
| Theoretical lectures in class and Lab                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                              |                                                 |                               |                   |
| 6. Number of Credit Hours (Total) / Number of Units (Total)         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                              |                                                 |                               |                   |
| 5/3                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                              |                                                 |                               |                   |
| 7. Course administrator's name (mention all, if more than one name) |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                              |                                                 |                               |                   |
| Name: Dr. Saleh Mohammed Saleh Email: s.zakaria@uomosul.edu.iq      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                              |                                                 |                               |                   |
| Name: Dr. Rasha M.Sami Fadhil Email: Rasha.Fadhil@uomosul.edu.iq    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                              |                                                 |                               |                   |
| 8. Course Objectives                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                              |                                                 |                               |                   |
| Course Objectives                                                   | The groundwater hydrology course is concerned with studying the movement of water in various groundwater reservoirs. After completing the course, the student will be knowledgeable about the following points:<br>The student's knowledge of the importance of groundwater hydrology. The student should be able to understand the movement of groundwater and its flow inside wells.<br>The student should be able to describe the hydraulic characteristics of groundwater reservoirs. Knowledge of the fundamental laws and equations to describe groundwater flow processes. General knowledge of the types and characteristics of groundwater aquifers. The student could be able to use software related to groundwater movement. |                                                                                                                                                                                                              |                                                 |                               |                   |
| 9. Teaching and Learning Strategies                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                              |                                                 |                               |                   |
| Strategy                                                            | The primary strategy to be adopted in delivering this course is to encourage students' participation in the exercises, while at the same time improving and expanding their critical thinking skills. This will be achieved through interactive classroom and educational programs and by looking at some issues to motivate students. using Power point presentation Lecture. Handouts, Field trip and you tubes.                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                              |                                                 |                               |                   |
| 10. Course Structure                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                              |                                                 |                               |                   |
| Week                                                                | Hours                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Required Learning Outcomes                                                                                                                                                                                   | Unit or subject name                            | Learning method               | Evaluation method |
| 1                                                                   | 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | General Introduction - What is groundwater? Groundwater and the water cycle, aquifers, the importance of groundwater, groundwater scenario                                                                   | A general introduction to groundwater hydrology | Theoretical lectures in class | H.W.              |
| 3-2                                                                 | 6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Aquifer characteristics, types of aquifers, confined aquifer<br>Unconfined aquifer, percolating aquifer, perched aquifer<br>Characteristics of aquifers, porosity, specific yield, permeability coefficient. | Definitions and terms                           | Theoretical lectures in class | H.W.              |

|       |   |                                                                                                                                                               |                                               |                               |      |
|-------|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|-------------------------------|------|
| 5-4   | 6 | Laws of groundwater movement: Darcy's law, hydraulic conductivity, transmissibility.                                                                          | Groundwater movement                          | Theoretical lectures in class | Exam |
| 7-6   | 6 | Groundwater flow from wells for steady flow: analysis of steady groundwater flow, and steady flow in confined and unconfined aquifers                         | Groundwater flow from wells for steady flow   | Theoretical lectures in class | H.W. |
| 8     | 3 | Monthly exam                                                                                                                                                  |                                               |                               |      |
| 11-9  | 9 | Groundwater flow from wells for unsteady flow: analysis of unsteady groundwater flow, and unsteady flow in confined and unconfined aquifers                   | Groundwater flow from wells for unsteady flow | Theoretical lectures in class | H.W. |
| 13-12 | 6 | Well hydraulics, well withdrawal, and steady flow to confined flow in the well - unconfined + introducing the student to programs for groundwater hydrology ( | Well hydraulics                               | Theoretical lectures in class | Exam |
| 14    | 3 | Well drilling - penetration speed, diameter, depth, and vibration level.                                                                                      | Drilling wells                                | Theoretical lectures in class | H.W. |
| 15    | 3 | Review the course content and prepare for the final exam                                                                                                      |                                               |                               |      |

### **Laboratory Experiments:**

| Week   | Hours | Required Learning Outcomes                                | Unit or subject name                                                                                                                    | Learning method | Evaluation method |
|--------|-------|-----------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|-----------------|-------------------|
| Week 1 | 2     | QGIS Introduction                                         | Getting to know the interface, adding the first layers, navigating the map                                                              | Computer Lab    | Homework          |
| Week 2 | 2     | Spatial Data Management – Symbols and Cartographic Design | Importing data (Vector & Raster), organizing tables, working with attributes, changing symbols, creating Choropleth maps, adding Labels | Computer Lab    | Homework          |
| Week 3 | 2     | Data Creation and Editing                                 | Digitizing, editing attributes, creating new datasets                                                                                   | Computer Lab    | Homework          |
| Week 4 | 2     | Spatial Analysis and Working with Raster Data             | Reprojection, Network Analysis, Spatial Statistics, Image Processing, Using Elevation Data, Merging and Analyzing Raster Data           | Computer Lab    | Exam              |
| Week 5 | 2     | Groundwater Model                                         | Understanding the mechanism of calculating well discharge, distribution, and groundwater flow                                           | Computer Lab    | Report            |

|         |   |                          |                                                                    |              |          |
|---------|---|--------------------------|--------------------------------------------------------------------|--------------|----------|
| Week 6  | 2 | Map and Report Output    | Creating dynamic maps, preparing reports and maps for printing     | Computer Lab | Homework |
| Week7   | 2 | Exam 1                   | Theoretical and Practical Exam                                     | Computer Lab | Exam     |
| Week 8  | 2 | Introduction to GMS      | Program interface, how to open a new project, importing basic data | Computer Lab | Homework |
| Week 9  | 2 | Geological Data Input    | Adding geological layers, entering well data and water levels      | Computer Lab | Homework |
| Week 10 | 2 | Conceptual Model Setup – | Defining zones, boundaries, and initial conditions                 | Computer Lab | Homework |
| Week 11 | 2 | Grid Creation            | Building a MODFLOW grid, defining cells and parameters             | Computer Lab | Homework |
| Week 12 | 2 | Running the Flow Model   | Executing MODFLOW, reading basic results, water levels, and flow   | Computer Lab | Report   |
| Week 13 | 2 | Results Output           | Creating maps and charts, preparing a simplified project report    | Computer Lab | Homework |
| Week 14 | 2 | Exam 1                   | Theoretical and Practical Exam                                     | Computer Lab | Exam     |
| Week 15 | 2 | Final Exam               |                                                                    | Computer Lab | Exam     |

| 11. Course Evaluation |        |
|-----------------------|--------|
| Evaluation type       | degree |
| Theoretical lectures  |        |
| H. w.                 | 10     |

|                            |            |
|----------------------------|------------|
| Quiz                       | 5          |
| Monthly exam               | 10         |
| Term exam                  | 5          |
| Final exam                 | 30         |
| <b>Laboratory lectures</b> |            |
| H. w.                      | 5          |
| Quiz                       | 5          |
| Monthly exam               | 5          |
| Term exam                  | 5          |
| Final exam                 | 20         |
| <b>Total</b>               | <b>100</b> |

## 12. Learning and Teaching Resources

|                                 |                                                                                                                                                                                                                                                                            |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Main references (sources)       | <ul style="list-style-type: none"> <li>Groundwater hydrology (2005) by Todd,D.K., Mays, L. W. Wiley</li> <li>Groundwater hydrology-Conceptual and computational Models (2003)by K.R.Rushton published by Wiley.</li> <li>Engineering Hydrology-McGraw-Hill,2008</li> </ul> |
| Electronic References, Websites | <a href="https://books.gw-project.org/groundwater-resource-development/part/references/">https://books.gw-project.org/groundwater-resource-development/part/references/</a>                                                                                                |

## Course Description Form

|                                                                     |
|---------------------------------------------------------------------|
| 1. Course Name:                                                     |
| Drainage Engineering                                                |
| 2. Course Code:                                                     |
| DWRE 324                                                            |
| 3. Semester / Year:                                                 |
| 2/2025–2026                                                         |
| 4. Description Preparation Date:                                    |
| 1/9/2025                                                            |
| 5. Available Attendance Forms:                                      |
| Theoretical lectures in class and practical in lab                  |
| 6. Number of Credit Hours (Total) / Number of Units (Total)         |
| 5/6                                                                 |
| 7. Course administrator's name (mention all, if more than one name) |
| Name: Dr. Ahmed A. M. Al-Ogaidi Email: a.alogaidi@uomosul.edu.iq    |
| Name: Abdulazeez A. M. Email: abdulazeez.mohammed@uomosul.edu.iq    |
| 8. Course Objectives                                                |

|                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Course Objectives</b> | <p>The Drainage Engineering course teaches students a lot of useful things in designing and understanding drainage networks. After completing this course, students are supposed to be familiar with the following points:</p> <ol style="list-style-type: none"> <li>10. Definition of drainage, its purpose, evidence and benefits, as well as an overview of the history of drainage in Iraq.</li> <li>11. Learn the basics of groundwater movement by studying Darcy's law, Laplace's equation, and Dupuis-Forchheimer's equation.</li> <li>12. Learn about the reclamation of saline soils, salts removal, and the requirements for washing them.</li> <li>13. Learn the exploratory and design investigations of drainage projects.</li> <li>14. Studying the various methods used to estimate the hydraulic conductivity of soils in the laboratory and field.</li> <li>15. Identifying the different drainage systems through their types, planning their locations and depths, and designing filters.</li> <li>16. Learn the basics of designing surface (open) and subsurface (covered) drainage sections.</li> <li>17. Designing the distances between the drains in the case of stable and unstable flow.</li> <li>18. Identifying the vertical drainage (drainage wells).</li> <li>19. Learn drainage maintenance.</li> <li>20. The relationship between drainage and environmental pollution.</li> </ol> |
|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## 9. Teaching and Learning Strategies

|                 |                                                                                                                                                                                                                                                                                                                                        |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Strategy</b> | The main strategy that will be adopted in delivering this module is to encourage student participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering some challenging problems to motivate students. |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## 10. Course Structure

| Week | Hours | Required Learning Outcomes                                                                                                  | Unit or subject name                                   | Learning method                      | Evaluation method |
|------|-------|-----------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|--------------------------------------|-------------------|
| 1    | 5     | Definition of drainage, its purpose, evidence and benefits, as well as an overview of the history of drainage in Iraq.      | General introduction on drainage of agricultural lands | Theoretical lectures in class        | Exam              |
| 2-3  | 10    | Learn the basics of groundwater movement by studying Darcy's law, Laplace's equation, and Dupuis-Forchheimer's equation.    | Principles of groundwater hydraulics                   | Theoretical lectures in class<br>Lab | HW & Exam         |
| 4-5  | 10    | Learn about the reclamation of saline soils, salts removal, and the requirements for washing them.                          | Reclamation of saline soils                            | Theoretical lectures in class        | HW & Exam         |
| 6    | 5     | Learn the exploratory and design investigations of drainage projects.                                                       | Drainage projects' investigations                      | Theoretical lectures in class        | HW & Exam         |
| 7-8  | 10    | Studying the various methods used to estimate the hydraulic conductivity of soils in the laboratory and field.              | Estimation of soil hydraulic conductivity              | Theoretical lectures in class<br>Lab | HW & Exam         |
| 9    | 5     | Identifying the different drainage systems through their types, planning their locations and depths, and designing filters. | Drainage systems                                       | Theoretical lectures in class        | HW & Exam         |
| 10   | 5     | Learn the basics of designing surface (open) and                                                                            | Design of drains' sections                             | Theoretical lectures in class        | HW & Exam         |

|       |    |                                                                                            |                                                     |                                     |           |
|-------|----|--------------------------------------------------------------------------------------------|-----------------------------------------------------|-------------------------------------|-----------|
|       |    | subsurface (covered) drainage sections.                                                    |                                                     |                                     |           |
| 11-13 | 15 | Designing the distances between the drains in the case of steady and unsteady state flow.  | Spacing between drains                              | Theoretical lectures in class & Lab | HW & Exam |
| 14    | 5  | Identifying the vertical drainage (drainage wells).                                        | Vertical drainage (drainage wells)                  | Theoretical lectures in class       | HW & Exam |
| 15    | 5  | Learn drainage maintenance. The relationship between drainage and environmental pollution. | Drains' maintenance<br>Drainage and water pollution | Theoretical lectures in class       | Exam      |

## 11. Course Evaluation

| Evaluation type | degree |
|-----------------|--------|
| 4 quizzes       | 16     |
| 7 homework      | 14     |
| 5 labs          | 5      |
| 1 report        | 5      |
| Midterm exam    | 10     |
| Final exam      | 50     |

## 12. Learning and Teaching Resources

|                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|--------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Required textbooks (curricular books, if any)                      | Al-Dabagh, Abdulsattar Younis, and Ali, Angham Ezz Al-Deen. <i>Drainage Engineering</i> . Dar Al-Kutob for Printing and Publishing, University of Mosul, Mosul, Iraq, 1992.                                                                                                                                                                                                                                                                                                    |
| Main references (sources)                                          | <ul style="list-style-type: none"> <li>Luthin, James N., and James N. Luthin. <i>Drainage engineering</i>. No. TC970 L8. New York: Wiley, 1973.</li> <li>Waller, Peter, and Muluneh Yitayew. <i>Irrigation and drainage engineering</i>. Springer, 2015.</li> <li>Al-Lamy, Muhsin M. A., and L-Janaby, Alaa', S. A. Drainage, investigations, designs, execution and maintenance. Dar Al-Kutob for Printing and Publishing, University of Mosul, Mosul, Iraq, 1991.</li> </ul> |
| Recommended books and references (scientific journals, reports...) | Ostad-Ali-Askari, K., & Shayan, M. (2021). Subsurface drain spacing in the unsteady conditions by HYDRUS-3D and artificial neural networks. <i>Arabian Journal of Geosciences</i> , 14, 1-14.                                                                                                                                                                                                                                                                                  |
| Electronic References, Websites                                    | <a href="http://kcl.digimat.in/nptel/courses/video/126105010/L41.html">http://kcl.digimat.in/nptel/courses/video/126105010/L41.html</a>                                                                                                                                                                                                                                                                                                                                        |

## Course Description Form

|                                       |
|---------------------------------------|
| 13. Course Name:                      |
| Soil Mechanics and Foundations        |
| 14. Course Code:                      |
| DWRE325                               |
| 15. Semester / Year:                  |
| Spring semester (second) / 2025 -2026 |

| 16. Description Preparation Date:                                    |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                     |                  |                   |
|----------------------------------------------------------------------|-------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|------------------|-------------------|
| 2025/10/15                                                           |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                     |                  |                   |
| 17. Available Attendance Forms:                                      |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                     |                  |                   |
| Class lectures + Lab. lectures                                       |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                     |                  |                   |
| 18. Number of Credit Hours (Total) / Number of Units (Total)         |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                     |                  |                   |
| 5/75                                                                 |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                     |                  |                   |
| 19. Course administrator's name (mention all, if more than one name) |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                     |                  |                   |
| Name: Zuheir Karabash                                                |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Email: karabash@uomosul.edu.iq      |                  |                   |
| 20. Course Objectives                                                |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                     |                  |                   |
| <b>Course Objectives</b>                                             |       | The objective of the soil mechanics and foundation Engineering course is to introduce the subject of geotechnical engineering. In this course, the student will understand and be familiar with important topics: soil improvements, compaction, soil investigation, shear stress in soils, bearing capacity of the soil lateral earth pressure and retaining walls, Upon completion of the soil mechanics and foundation engineering course, students should be able to apply principles of soil mechanics and in the analysis, design, and construction of civil engineering projects. |                                     |                  |                   |
| 21. Teaching and Learning Strategies                                 |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                     |                  |                   |
| <b>Strategy</b>                                                      |       | The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials, and by considering some challenging problems to motivate students.                                                                                                                                                                                                                                                |                                     |                  |                   |
| 22. Course Structure                                                 |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                     |                  |                   |
| Week                                                                 | Hours | Required Learning Outcomes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Unit or subject name                | Learning method  | Evaluation method |
| 1                                                                    | 5     | Definition of foundation engineering and soil mechanics                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Introduction and general formation. | Lecture in class | Class discussions |
| 2                                                                    | 5     | Learn about soil investigation and its methods                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Soil investigation                  | Lecture in class | HW and Quiz       |
| 3+4+5                                                                | 5+5+5 | Knowing the soil shear strength and its parameters and importance                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Soil shear strength.                | Lecture in class | Quiz              |

|       |     |                                                               |                                         |                  |                                  |
|-------|-----|---------------------------------------------------------------|-----------------------------------------|------------------|----------------------------------|
|       |     | Shear strength tests                                          | Soil shear strength determination tests | In Lab.          | Report                           |
| 6+7   | 5+5 | Learn the soil stabilization methods                          | Soil stabilization.                     | Lecture in class | Class discussions                |
|       |     | Learn how to estimate soil compaction and field density tests | Compaction test and field density test  | In Lab.          | Report                           |
| 8     | 5   | Learn the bearing capacity of the soil                        | Soil bearing capacity                   | Lecture in class | Course                           |
| 9     | 5   | Bearing capacity determination methods                        | Bearing capacity determination          | Lecture in class | Quiz and Course Examination No.1 |
| 10    | 5   | Knowledge the analysis and design of footing on clay          | Footing on clayey soil.                 | Lecture in class | Homework assignment              |
| 11    | 5   | Knowledge the analysis and design of footing on sand          | Footing on sand                         | Lecture in class | Homework assignment              |
| 12    | 5   | Knowledge the analysis and design of footing on rock          | Footing on rock                         | Lecture in class | Homework assignment              |
| 13    | 5   | Knowing the lateral earth pressures                           | lateral earth pressures                 | Lecture in class | Quiz                             |
| 14+15 | 5+5 | Learning the analysis and design of retaining walls           | Retaining walls                         | Lecture in class | Quiz                             |

### 23. Course Evaluation

| Evaluation type                  | degree |
|----------------------------------|--------|
| Homework, classwork, reports (6) | 2      |
| Quizzes (2)                      | 5      |
| Term exam (2)                    | 28     |
| Laboratory, experimental part    | 15     |
| Final exam                       | 50     |

|                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|--------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Total                                                              | 100                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>24. Learning and Teaching Resources</b>                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Required textbooks (curricular books, if any)                      | <ul style="list-style-type: none"> <li>Al-Asho, M. O “Soil Mechanics Principles”, 1990 Student textbook, University of Mosul.<br/>الشكرجي ، يوسف والمحمدي، نوري، " هندسة الأسس " ، جامعة بغداد ، الطبعة الاولى،</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Main references (sources)                                          | <ul style="list-style-type: none"> <li>Das, B.M. and Sobhan, K. “Principle of Geotechnical Engineering”, ninth Edition, Cengage Learning.</li> <li>Das, B. M., "Principle of Foundation Engineering ", Thomson Books/Cole, California State University, Sacramento, 5th ed., 2004.</li> <li>- Peak, R. B., Hanson, W. E. and Thorburn, T.H., " Foundation Engineering ", John Wiley and Sons, 2nd ed., 1974</li> <li>- Bowles, J.E., P.E., S.E." Foundation Analyses and Design ", The McGraw-Hill Companies, Inc, 5th ed., 2006.</li> <li>-Das, B. M., &amp; Sivakugan, N., " Principles of foundation engineering", Cengage learning, 2018.</li> <li>o Coduto, D.P. “ Geotechnical Engineering Principle and practices”, 1999, Prentice-Hall, Inc.</li> <li>o</li> </ul> |
| Recommended books and references (scientific journals, reports...) | <ol style="list-style-type: none"> <li>Al-Rafidain Engineering Journal.</li> <li>Highway Research Record, H R R.</li> <li>Journal of the Geotechnical Engineering Division, ASCE.</li> <li>Journal of Soil Mechanics and Foundation Division, Proc. ASCE.</li> <li>Transportation Research Record, TRR.</li> <li>Journal of the Japan Society of Engineering, JSCE.</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                             |
| Electronic References, Websites                                    | None                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

1. Course Name:

|                                                                       |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                            |                        |                          |
|-----------------------------------------------------------------------|--------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|------------------------|--------------------------|
| Consumptive use and water duty                                        |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                            |                        |                          |
| 2. Course Code:                                                       |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                            |                        |                          |
| DWRE 326                                                              |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                            |                        |                          |
| 3. Semester / Year:                                                   |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                            |                        |                          |
| Second Semester/2025-2026                                             |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                            |                        |                          |
| 4. Description Preparation Date:                                      |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                            |                        |                          |
| 1/2/2025                                                              |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                            |                        |                          |
| 5. Available Attendance Forms:                                        |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                            |                        |                          |
| Theoretical lectures in class                                         |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                            |                        |                          |
| 6. Number of Credit Hours (Total) / Number of Units (Total)           |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                            |                        |                          |
| 4hour*15 week=60 hour/4 Units                                         |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                            |                        |                          |
| 7. Course administrator's name (mention all, if more than one name)   |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                            |                        |                          |
| Dr. Anmar Abdulaziz AL-Talib    anmar.altalib@uomosul.edu.iq          |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                            |                        |                          |
| Alaa ismail naser                      engalaaismail79@uomosul.edu.iq |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                            |                        |                          |
| 8. Course Objectives                                                  |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                            |                        |                          |
| <b>Course Objectives</b>                                              |              | 1. how to use mathematical relations in a calculation of the potential Consumptive use( Eto) of different crops .<br>2. Identify the different stages of crop growth.<br>3. Draw the crop coefficient curve for different crops.<br>4. Calculating the water consumption of the crop.<br>5. Identify the different irrigation efficiencies within the field.<br>6. Calculation of water duty for irrigation projects .<br>7. Learn about different irrigation methods and their specifications. |                                                                                            |                        |                          |
| 9. Teaching and Learning Strategies                                   |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                            |                        |                          |
| <b>Strategy</b>                                                       |              | i) An ability to distinguish, identify, define, formulate, and solve engineering problems by applying principles of engineering, science and mathematics.                                                                                                                                                                                                                                                                                                                                       |                                                                                            |                        |                          |
| 10. Course Structure                                                  |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                            |                        |                          |
| <b>Week</b>                                                           | <b>Hours</b> | <b>Required Learning Outcomes</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <b>Unit or subject name</b>                                                                | <b>Learning method</b> | <b>Evaluation method</b> |
| 1-2                                                                   | 8            | Absolute water consumption - transpiration - evaporation - conditions affecting water consumption - direct measurements of water consumption - Hargreves equation - water consumption of natural plants,                                                                                                                                                                                                                                                                                        | Introducing the student to the importance of calculating plant water consumption           | Lecture                |                          |
| 3-4                                                                   | 8            | Find crop coefficient Kc for different plants and calculate water consumption of crop ETc, - Meteorology as a guide for water consumption - Plani - Creedli method - Jensen - Hayes method Climate and plant physiology (functions of plant members) and their relevance to water consumption                                                                                                                                                                                                   | Introducing the student to how to calculate crop parameters and the most important methods | Lecture                | H.W(1)                   |

|             |    |                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                               |         |               |
|-------------|----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|---------------|
| 5           | 4  | Plant growth season - Water consumption needs for crops during the growing season - Practical considerations                                                                                                                                                                                                                                                                                       | Introducing the student to how to calculate the water consumption                                                                                                                             | Lecture | Daily exam(1) |
| 6-7         | 8  | When to irrigate - and how much water to apply, the soil moisture endpoints, the external appearance of the crop, Use of various crops for water, available water resources, winter irrigation, Autumn irrigation                                                                                                                                                                                  | Introducing the student to how to calculate and determine irrigation dates                                                                                                                    | Lecture | H.W(2)        |
| 8-9         | 8  | The effect of the sedimentary soil layer, the stage of plant growth and its effect on the irrigation method, irrigation during the vegetative growth stage, the method of flowering irrigation                                                                                                                                                                                                     | Introducing the student to how moisture is removed                                                                                                                                            | Lecture | H.W(3)        |
| 10          | 4  | Midterm Exam                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                               |         |               |
| 11,12 and13 | 12 | The method of irrigation during the fruiting period, depth of the root area, irrigation frequency (irrigation rotation), irrigation efficiency, water transfer efficiency, water application efficiency, water use efficiency, water storage efficiency, sprinkler irrigation, other uses of sprinkler networks, basic conditions for sprinkler irrigation system design, sprinkler network design | Introducing students to how to calculate irrigation efficiencies and how to calculate water consumption efficiency, in addition to introducing students to the basics of sprinkler irrigation | lecture | Monthly exam  |
| 14-15       | 8  | Drip irrigation, the benefits of drip irrigation, potential problems of drip irrigation, Surface irrigation and underground irrigation (under surface) Free flooding without control, submerged slides, submerged docks, internal irrigation, hydraulic surface irrigation                                                                                                                         |                                                                                                                                                                                               |         |               |

### 11. Course Evaluation

| Evaluation type | Degree |
|-----------------|--------|
| 2 quizzes       | 10%    |
| 4 homework      | 5%     |
| Term exam       | 25%    |
| Final exam      | 60%    |
| Total           | 100%   |

### 12. Learning and Teaching Resources

|                                               |                                                                                                                                                                                                                                                                                      |
|-----------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Required textbooks (curriculum books, if any) | <ul style="list-style-type: none"> <li>Irrigation principles and practices, by V.E. Hansen, O.W. Israelsen and G.F. Stringham, fourth edition, John Wiley and Sons, 1984.</li> </ul>                                                                                                 |
| Main references (sources)                     | <ul style="list-style-type: none"> <li>Crop water requirements (FAO – 24)</li> <li>-Crop evapotranspiration –guide lines for computing crop water requirements (FAO –56)</li> <li>Design manual for irrigation &amp; drainage- ministry of irrigation-Iraq (pencil), 1980</li> </ul> |
| Electronic References, Website                | <a href="https://classroom.google.com/c/ODE1NzgxMTk4OTg4">https://classroom.google.com/c/ODE1NzgxMTk4OTg4</a>                                                                                                                                                                        |

## Course Description Form

| 1. Course Name:                                                                                                                                                          |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                |                      |                   |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|----------------------|-------------------|
| Planning and Designing of Engineering Projects                                                                                                                           |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                |                      |                   |
| 2. Course Code:                                                                                                                                                          |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                |                      |                   |
| DWRE 327                                                                                                                                                                 |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                |                      |                   |
| 3. Semester / Year:                                                                                                                                                      |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                |                      |                   |
| Second / 2025–2026                                                                                                                                                       |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                |                      |                   |
| 4. Description Preparation Date:                                                                                                                                         |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                |                      |                   |
| 14/1/2026                                                                                                                                                                |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                |                      |                   |
| 5. Available Attendance Forms:                                                                                                                                           |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                |                      |                   |
| Lectures in the classroom.<br>A practical lecture conducted in the laboratory.                                                                                           |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                |                      |                   |
| 6. Number of Credit Hours (Total) / Number of Units (Total)                                                                                                              |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                |                      |                   |
| 2 hours/ 2 credits                                                                                                                                                       |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                |                      |                   |
| 7. Course administrator's name (mention all, if more than one name)                                                                                                      |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                |                      |                   |
| Dr. Anmar Abdulaziz Al-Talib                      Email: anmar.altalib@uomosul.edu.iq<br>Dr. Zeyad Ayoob Sulaiman                      Email: z.alsinjari@uomosul.edu.iq |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                |                      |                   |
| 8. Course Objectives                                                                                                                                                     |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                |                      |                   |
| Course Objectives                                                                                                                                                        |       | <p>After successfully completing this course, the student is expected to understand the nature and characteristics of engineering projects, comprehend the engineering project life cycle and its different phases, and systematically analyze engineering problems to identify their root causes. The student is also expected to acquire the ability to define project scope, identify stakeholders, as well as to participate in the preparation of preliminary plans for engineering projects in terms of time, resources, and risks.</p> <p>The course also aims to introduce students to the specific characteristics of water resources engineering projects and their technical and environmental complexities, and to develop analytical thinking and engineering decision-making skills. This prepares graduates for effective participation in the planning and implementation of engineering projects and provides a suitable foundation for some postgraduate courses in project management and engineering.</p> |                                                                |                      |                   |
| 9. Teaching and Learning Strategies                                                                                                                                      |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                |                      |                   |
| Strategy                                                                                                                                                                 |       | The main teaching strategy for this course is based on a combination of theoretical lectures, classroom discussions, and the analysis of real-world case studies, with an emphasis on encouraging active student participation and critical thinking. The course also focuses on linking theoretical concepts with practical applications in water resources engineering projects, and on developing students' skills in analysis, problem-solving, and teamwork.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                |                      |                   |
| 10. Course Structure                                                                                                                                                     |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                |                      |                   |
| Week                                                                                                                                                                     | Hours | Required Learning Outcomes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Unit or subject name                                           | Learning method      | Evaluation method |
| 1                                                                                                                                                                        | 2     | Explain the concept and characteristics of engineering projects and distinguish between engineering projects and operational activities                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Introduction to Engineering Projects and Their Characteristics | Theoretical Lectures | —                 |

|    |   |                                                                                                                                       |                                                            |                      |                    |
|----|---|---------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|----------------------|--------------------|
| 2  | 2 | Describe the stages of the engineering project life cycle and explain the objectives of each stage                                    | Engineering Project Life Cycle and Its Phases              | Theoretical Lectures | —                  |
| 3  | 2 | Analyze engineering problems and identify their root causes using systematic analytical methods                                       | Engineering Problem Analysis and Root Cause Identification | Theoretical Lectures | Homework (1)       |
| 4  | 2 | Define project scope accurately and identify stakeholders and analyze their roles and influence                                       | Project Scope Definition Stakeholders                      | Theoretical Lectures | —                  |
| 5  | 2 | Apply engineering design methodology and generate appropriate design alternatives for engineering projects                            | Engineering Design Methodology Alternatives Generation     | Theoretical Lectures | Quiz (1)           |
| 6  | 2 | Develop a Work Breakdown Structure (WBS) and decompose the project into manageable activities                                         | Work Breakdown Structure (WBS)                             | Theoretical Lectures | —                  |
| 7  | 2 | Prepare a preliminary project schedule and estimate durations of engineering activities                                               | Project Scheduling                                         | Theoretical Lectures | —                  |
| 8  | 2 | Analyze the Critical Path Method (CPM) and identify critical activities and their impact on project duration                          | Critical Path Method (CPM) and Applications                | Theoretical Lectures | Midterm Exam       |
| 9  | 2 | Plan human and material resources and define responsibilities within the engineering project                                          | Resource Management Responsibilities                       | Theoretical Lectures | —                  |
| 10 | 2 | Identify potential risks in engineering projects, evaluate them, and propose mitigation measures                                      | Risk Management Engineering Projects                       | Theoretical Lectures | Project            |
| 11 | 2 | Apply monitoring and evaluation techniques to compare actual performance with planned performance and take corrective actions         | Project Monitoring Evaluation                              | Theoretical Lectures | —                  |
| 12 | 2 | Explain the specific characteristics of water resources engineering projects in terms of planning, execution, and environmental risks | Characteristics of Water Resources Engineering Projects    | Theoretical Lectures | Quiz (2)           |
| 13 | 2 | Explain the principles of engineering ethics and relate them to sustainability concepts in projects                                   | Engineering Ethics Sustainability                          | Theoretical Lectures | Homework (2)       |
| 14 | 2 | Review and integrate course concepts and prepare for the final evaluation through discussion and analysis                             | General Review                                             | Presentation         | Project Submission |
| 15 | 2 | Apply the acquired concepts and theories of the course in an integrated manner                                                        | General Review                                             | Discussion           | —                  |
| 16 | 3 | Preparatory week before the final examination                                                                                         | —                                                          | —                    | Final Exam         |

## 11. Course Evaluation

| Evaluation type | Degree     |
|-----------------|------------|
| 2 Quizzes       | 7.5        |
| 2 Homeworks     | 5          |
| Project         | 5          |
| Midterm Exam    | 12.5       |
| Final Exam      | 60         |
| <b>Total</b>    | <b>100</b> |

## 12. Learning and Teaching Resources

|                                                                       |                                                                                                                                                                |
|-----------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Required textbooks (curricular books, if any)                         |                                                                                                                                                                |
| Main references (sources)                                             | <ul style="list-style-type: none"><li>• Project Management Institute, <i>PMBOK Guide</i>.<br/>Chitkara, K. K., <i>Engineering Project Management</i></li></ul> |
| Recommended books and references<br>(scientific journals, reports...) | <ul style="list-style-type: none"><li>• Dym, C. L., <i>Engineering Design</i>.<br/>Program Design and Planning Manual.</li></ul>                               |
| Electronic References, Websites                                       |                                                                                                                                                                |

# Fourth Level

## 18 UNITS

| Code    | Module                                       | Theoretical | Practical | Applied | Units |
|---------|----------------------------------------------|-------------|-----------|---------|-------|
| DWRE401 | Design of Hydraulic Structures I             | 2           | 2         | 1       | 3     |
| DWRE402 | Design of Gravity Irrigation Systems         | 2           | 2         | 1       | 3     |
| DWRE403 | Design of irrigation and drainage networks I | 1           | 2         | -       | 2     |
| DWRE404 | Estimation and engineering Specifications I  | 1           | 2         | -       | 2     |
| DWRE405 | Economic Sciences                            | 2           | -         | 2       | 2     |
| DWRE406 | Dams Engineering I                           | 2           | -         | 2       | 2     |
| DWRE407 | Foundation Engineering I                     | 2           | -         | -       | 2     |
| DWRE408 | Engineering Project I                        | -           | 4         | -       | 2     |

## 18 UNITS

| Code    | Module                                          | Theoretical | Practical | Applied | Units |
|---------|-------------------------------------------------|-------------|-----------|---------|-------|
| DWRE409 | Design of Hydraulic Structures II               | 1           | 2         | 1       | 2     |
| DWRE410 | Design of Sprinkler and Drip Irrigation Systems | 1           | 2         | 1       | 2     |
| DWRE411 | Design of irrigation and drainage networks II   | 1           | 2         | -       | 2     |
| DWRE412 | Estimation and engineering specifications II    | 1           | 2         | -       | 2     |
| DWRE413 | Engineering Management                          | 2           | -         | 2       | 2     |
| DWRE414 | Dams Engineering 2                              | 2           | -         | 2       | 2     |
| DWRE415 | Foundation Engineering II                       | 2           | -         | -       | 2     |
| DWRE416 | Engineering Project II                          | -           | 4         | -       | 2     |
| DWRE417 | Applied Sciences                                | 2           | -         | -       | 2     |

## Course Description: “Design of Hydraulic Structures I”

|                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 13. Course Name:                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Design of Hydraulic Structures I                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 14. Course Code:                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| DWRE 401                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 15. Semester / Year:                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 1/ 2025–2026                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 16. Description Preparation Date:                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 9/2025                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 17. Available Attendance Forms:                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| In-person                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 18. Number of Credit Hours (Total) / Number of Units (Total)                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 5/3                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 19. Course administrator's name (mention all, if more than one name)         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Name: Nashwan Kamal Aldeen Mohammed<br>Email: nashwan.alomari@uomosul.edu.iq |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 20. Course Objectives                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Course Objectives</b>                                                     | <ul style="list-style-type: none"> <li>To identify and classify the hydraulic structures and their safety requirements. (ii)</li> <li>To develop a design of the hydraulic structure floor length that satisfies requirements. (ii)</li> <li>To applying all standards and design criteria to find the suitable soil types for this structure. (ii)</li> <li>To design the floor thickness of the hydraulic structure and find the appropriate floor thickness. (ii)</li> <li>To give valuable recommendations that can be considered to prevent this rupture. (ii)</li> </ul> |
| 21. Teaching and Learning Strategies                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Strategy</b>                                                              | <p>The primary strategy that will be adopted in delivering this module is to encourage students’ participation in classes, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials, and practical designing of the hydraulic structures.</p> <p>PowerPoint presentations and boards are used in the classroom. Examples and problems will be solved and illustrated on the classroom board. Tutorials are also organized to establish closer contact with students.</p>                     |

## 22. Course Structure

| Week               | Hours | Required Learning Outcomes                                                                                                                                                                                                                                                                  | Unit or subject name                                                                                                                                                        | Learning method           | Evaluation method                    |
|--------------------|-------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|--------------------------------------|
| 1                  | 4     | Classify the hydraulic structures and their uses,                                                                                                                                                                                                                                           | Subject topics - Introduction of types of hydraulic structures                                                                                                              | Presentation              |                                      |
| 2, 3, 4, and 5     | 16    | <ol style="list-style-type: none"> <li>1. Recognize problems accompanying water seepage under the hydraulic structures,</li> <li>2. Apply the basic concepts of engineering to calculate seepage and uplift pressure under different hydraulic structures,</li> </ol>                       | Irrigation structures on permeable foundations. Seepage and Uplift pressure – Bligh theory – Lane theory – Flow net analysis- Khosla's theory                               | Presentation & whiteboard | Quiz1, and Assignment 1              |
| 6                  | 4     | Recognize the components of Protection works of approaches for horizontal floor                                                                                                                                                                                                             | Protection works of approaches for horizontal floor                                                                                                                         | Presentation              |                                      |
| 7, 8, 9, and 10    | 16    | Identify the components of the stilling basin and design some of their types.                                                                                                                                                                                                               | Hydraulic jump and energy dissipation devices<br>- drawing of hydraulic jump- Stilling basins (R.S.Varshney stilling basin, SAF stilling basin, U.S.B.R II stilling basin). | Presentation & whiteboard | Quiz2, Assignment2, and Monthly exam |
| 11, 12, 13, and 14 | 16    | <ol style="list-style-type: none"> <li>1. Develop the ability of the students to solve design problems and analyze the data to evaluate the feasibility of components of the head and cross-regulator</li> <li>2. Assess and analyze the safety of the head and cross regulator,</li> </ol> | Head and Cross regulator                                                                                                                                                    | Presentation & whiteboard | Term exam                            |

|    |   |                                                                                                                                                               |                                                                                   |                           |  |
|----|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|---------------------------|--|
| 15 | 4 | Demonstrate the ability to lead and productively participate in group situations by assigning multidisciplinary design projects for some hydraulic structures | a design and apply the example of the cross and head regulator + General Revision | Presentation & whiteboard |  |
|----|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|---------------------------|--|

### 1. Course Evaluation

| Evaluation type | Degree |
|-----------------|--------|
| 2 Quizzes       | 8      |
| 2 Assignments   | 8      |
| Monthly Exam    | 10     |
| Term Exam       | 14     |
| Final Exam      | 60     |
| Total           | 100    |

### 2. Learning and Teaching Resources

|                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|--------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Required textbooks (curricular books, if any)                      | Varshney, R.S., Gupta, S. C., Gupta, R. L., (1979) “ <i>Theory &amp; design of irrigation structures</i> ”. Nem Chand & Bros; Roorkee, India.                                                                                                                                                                                                                                                                                                                                                                                                              |
| Main references (sources)                                          | <ol style="list-style-type: none"> <li>Asawa, G. L. (2008) “<i>Irrigation and Water Resources Engineering</i>” New age International(P) Limited, Publishers.</li> <li>Chanson, Hubert., (2004) “<i>The Hydraulics of Open Channel Flow: An Introduction</i>” Elsevier.</li> <li>Chow, Ven te., (1959) “<i>Open Channels Hydraulics</i>” Mc Graw Hill.</li> <li>Schall, J.D., Thompson, p. L., Zeryes, S. M., Kilgore, R. T., and Morris, J. L. (2012) “<i>Hydraulic design of Highway culverts</i> “ ( Report No . FHWA – HIF – 12 – 026 HD55).</li> </ol> |
| Recommended books and references (scientific journals, reports...) | None                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Electronic References, Websites                                    | None                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

## Course Description Form

|                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |             |                                                                                          |                                        |                          |
|--------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------------------------------------------------------------------------------------------|----------------------------------------|--------------------------|
| <b>1. Course Name:</b>                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |             |                                                                                          |                                        |                          |
| Design of Gravity Irrigation Systems                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |             |                                                                                          |                                        |                          |
| <b>2. Course Code:</b>                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |             |                                                                                          |                                        |                          |
| DWR 410                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |             |                                                                                          |                                        |                          |
| <b>3. Semester / Year:</b>                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |             |                                                                                          |                                        |                          |
| Spring/ 2025-2026                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |             |                                                                                          |                                        |                          |
| <b>4. Description Preparation Date:</b>                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |             |                                                                                          |                                        |                          |
| 15-3-2025                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |             |                                                                                          |                                        |                          |
| <b>5. Available Attendance Forms:</b>                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |             |                                                                                          |                                        |                          |
| In person                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |             |                                                                                          |                                        |                          |
| <b>6. Number of Credit Hours (Total) / Number of Units (Total)</b>                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |             |                                                                                          |                                        |                          |
| 3/3                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |             |                                                                                          |                                        |                          |
| <b>7. Course administrator's name (mention all, if more than one name)</b>                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |             |                                                                                          |                                        |                          |
| Name: Dr. Zeyad Ayoob Sulaiman, Mr. Mohammed Tareq Mahmood<br>Email: z.alsinjarii@uomosul.edu.iq |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |             |                                                                                          |                                        |                          |
| <b>8. Course Objectives</b>                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |             |                                                                                          |                                        |                          |
| <b>Course Objectiv</b>                                                                           | Students who successfully complete this course have: <ol style="list-style-type: none"> <li>1. Learned characteristics of various methods of surface irrigation systems, (i)</li> <li>2. Understood economics of irrigation, (i)</li> <li>3. Able to design various types of gravity irrigation systems after collecting the required design data and analyzing these data in a way that suits the design of the surface irrigation system design, (i) and (ii)</li> <li>4. Able to select a suitable irrigation system for a given situation, (ii)</li> <li>5. Able to select the most economic irrigation design alternative, (vi)</li> </ol> |             |                                                                                          |                                        |                          |
| <b>9. Teaching and Learning Strategies</b>                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |             |                                                                                          |                                        |                          |
| <b>Strategy</b>                                                                                  | Power point presentation Lecture. Handouts, Field trip and you tubes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |             |                                                                                          |                                        |                          |
| <b>10. Course Structure</b>                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |             |                                                                                          |                                        |                          |
| <b>Week</b>                                                                                      | <b>Hours</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <b>L. O</b> | <b>Unit or subject name</b>                                                              | <b>Learning method</b>                 | <b>Evaluation method</b> |
| 1                                                                                                | 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | i           | Introduction to the farm irrigation and the basics of system desi                        | Powerpoint<br>Whiteboard<br>discussion | H.W                      |
| 2                                                                                                | 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | i           | Basic design Factors/Consumptive use/Soil/Irrigation interval<br>water application depth | Powerpoint<br>Whiteboard<br>doscussion | exam                     |
| 3                                                                                                | 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | i           | Efficiency ,adequacy ,and uniformity of irrigation                                       | Powerpoint<br>Whiteboard<br>doscussion | H.W                      |

|    |   |            |                                                                                                                   |                                        |      |
|----|---|------------|-------------------------------------------------------------------------------------------------------------------|----------------------------------------|------|
| 4  | 4 | i&ii       | Water infiltration into soil                                                                                      | Powerpoint<br>Whiteboard<br>doscussion | exam |
| 5  | 4 | i&ii       | Land grading/Description ,criteria ,and preparatory steps/ Design<br>land grading/Slopes and field levels         | Powerpoint<br>Whiteboard<br>doscussion | exam |
| 6  | 4 | ii         | Earthwork balance and earthwork calculations                                                                      | Powerpoint<br>Whiteboard<br>doscussion | exam |
| 7  | 4 | ii         | Surface irrigation/Mechanism of surface irrigation<br>process/Infiltration opportunity time and application depth | Powerpoint<br>Whiteboard<br>doscussion | H.W  |
| 8  | 4 | ii         | Water balance concept in surface irrigation                                                                       | Powerpoint<br>Whiteboard<br>doscussion | exam |
| 9  | 4 | ii         | Border irrigation system/Assumptions ,considerations<br>limitations of design/Miscellaneous notes                 | Powerpoint<br>Whiteboard<br>doscussion | exam |
| 10 | 4 | vi         | Design flow rate/Flow depth/Maximum border length/Border width                                                    | Powerpoint<br>Whiteboard<br>doscussion | exam |
| 11 | 4 | ii         | Furrow irrigation/Furrow intake characteristics/ Considerations<br>assumptions, limitations, and design equations | Powerpoint<br>Whiteboard<br>doscussion | H.W  |
| 12 | 4 | i&ii       | Runoff control techniques                                                                                         | Powerpoint<br>Whiteboard<br>doscussion | exam |
| 13 | 4 | vi         | Cutback irrigation, Runoff recovery system                                                                        | Powerpoint<br>Whiteboard<br>doscussion | H.W  |
| 14 | 4 | vi         | Basin irrigation/ Considerations, assumptions, limitations,<br>design equations/Booher method                     | Powerpoint<br>Whiteboard<br>doscussion | exam |
| 15 | 4 | I,ii<br>vi | Final Exam                                                                                                        |                                        | Exam |

### 11.Course Evaluation

|                        |       |
|------------------------|-------|
| Four Exams, (each 3pt) | 12pt  |
| Midterm Exam           | 20pt  |
| Homework               | 8 pt  |
| Final Exam             | 60pt  |
| Total                  | 100pt |

### 12.Learning and Teaching Resources

|                                                                             |                                                                                                   |
|-----------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|
| Required textbooks<br>(curricular books, if any)                            | On-farm irrigation systems engineering\by A.Y.Hachum, and H.I.Yasin. textbook- M University,1992. |
| Main references (sources)                                                   | Recahrd H. Cuenca Irrigation System Design: An Engineering Approach, 1989.                        |
| Recommended books<br>and references<br>(scientific journals,<br>reports...) |                                                                                                   |

|                     |         |                                                                                                                                           |
|---------------------|---------|-------------------------------------------------------------------------------------------------------------------------------------------|
| Electronic Websites | Referen | <a href="https://www.youtube.com/channel/UCg_SvLC7LCRLmVtTApYLA/videos">https://www.youtube.com/channel/UCg_SvLC7LCRLmVtTApYLA/videos</a> |
|---------------------|---------|-------------------------------------------------------------------------------------------------------------------------------------------|

## Course Description Form

|                                                                                                                                                                                                                                      |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                           |                              |                          |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|------------------------------|--------------------------|
| <b>1. Course Name:</b>                                                                                                                                                                                                               |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                           |                              |                          |
| Design of irrigation and drainage networks I                                                                                                                                                                                         |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                           |                              |                          |
| <b>2. Course Code:</b>                                                                                                                                                                                                               |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                           |                              |                          |
| DWRE 403                                                                                                                                                                                                                             |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                           |                              |                          |
| <b>3. Semester / Year:</b>                                                                                                                                                                                                           |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                           |                              |                          |
| First 2025-2026                                                                                                                                                                                                                      |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                           |                              |                          |
| <b>4. Description Preparation Date:</b>                                                                                                                                                                                              |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                           |                              |                          |
| 1/9/2025                                                                                                                                                                                                                             |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                           |                              |                          |
| <b>5. Available Attendance Forms:</b>                                                                                                                                                                                                |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                           |                              |                          |
| Lectures and Tutorials                                                                                                                                                                                                               |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                           |                              |                          |
| <b>6. Number of Credit Hours (Total) / Number of Units (Total)</b>                                                                                                                                                                   |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                           |                              |                          |
| 3 hr/2 credits                                                                                                                                                                                                                       |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                           |                              |                          |
| <b>7. Course administrator's name (mention all, if more than one name)</b>                                                                                                                                                           |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                           |                              |                          |
| Name: Azza Nasralla Jaralla Al-Talib<br>Email: <a href="mailto:a.altalib@uomosul.edu.iq">a.altalib@uomosul.edu.iq</a><br>Abdul Ghani Khalaf Muhammad<br><a href="mailto:alrobaai1982@uomosul.edu.iq">alrobaai1982@uomosul.edu.iq</a> |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                           |                              |                          |
| <b>8. Course Objectives</b>                                                                                                                                                                                                          |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                           |                              |                          |
| <b>Course Objectives</b>                                                                                                                                                                                                             |              | <ul style="list-style-type: none"> <li>Inform students about the principles of naming and numbering the canals and drain networks i</li> <li>learn canals and drains layout on contour maps i</li> <li>Inform about water supply systems and calculating discharge in canals sections i,ii</li> <li>Inform types of earth canals and their design i ,ii</li> <li>Lear drawing the synoptic diagram for canals and drains ii</li> <li>Lear methods of calculating seepage from earth canals i,ii</li> </ul> |                                                           |                              |                          |
| <b>9. Teaching and Learning Strategies</b>                                                                                                                                                                                           |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                           |                              |                          |
| <b>Strategy</b>                                                                                                                                                                                                                      |              | The strategy is to provide theoretical lectures using presentations and question solving in an interactive way with students inside the classroom, as well as tutorials exercises.                                                                                                                                                                                                                                                                                                                         |                                                           |                              |                          |
| <b>10. Course Structure</b>                                                                                                                                                                                                          |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                           |                              |                          |
| <b>Week</b>                                                                                                                                                                                                                          | <b>Hours</b> | <b>Required Learning Outcomes</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | <b>Unit or subject name</b>                               | <b>Learning method</b>       | <b>Evaluation method</b> |
| 1                                                                                                                                                                                                                                    | 2            | Learn about Naming and Numbering, i irrigation and drainage networks                                                                                                                                                                                                                                                                                                                                                                                                                                       | Naming and numbering for irrigation and drainage networks | Presentation And white board | Monthly exam             |
| 2                                                                                                                                                                                                                                    | 2            | Learn layout of irrigation and drainage networks on contour                                                                                                                                                                                                                                                                                                                                                                                                                                                | layout of irrigation and drainage                         | Presentation And white board | Monthly exam             |

|     |   |                                                                     |                                                       |                              |              |
|-----|---|---------------------------------------------------------------------|-------------------------------------------------------|------------------------------|--------------|
|     |   | maps, i                                                             | networks                                              |                              |              |
| 3   | 2 | Learn water supply Systems,i                                        | water supply systems                                  | Presentation And white board | Monthly exam |
| 4&5 | 4 | Learn calculating Discharge for different Irrigation systems,i      | Calculating discharges for canals.                    | Presentation And white board | Monthly exam |
| 6   | 2 | Inform types of earth Canal and design using Lacey equations ,i ,ii | types of earth Canal and design using Lacey equations | Presentation And white board | Monthly Exam |
| 7   | 2 | First monthly exam                                                  |                                                       |                              |              |
| 8&9 | 4 | Learn design of earth Canal using general Design method i,ii        | design of earth Canal using general Design method     | Presentation And white board | Monthly Exam |
| 10  | 2 | Learn drawing ground Profiles for canal Networks,ii                 | drawing ground Profiles for canal networks            | white board                  | Monthly Exam |
| 11  | 2 | Learn drawing ground Profiles for drainage Networks,ii              | drawing ground Profiles for drainage networks         | white board                  | Monthly Exam |
| 12  | 2 | Learn drawing the Synoptic diagram For canals,ii                    | drawing the Synoptic diagram For canals               | white board                  | Monthly Exam |
| 13  | 2 | Learn drawing ground Profiles for drain Networks,ii                 | drawing ground Profiles for drain networks            | white board                  | Monthly Exam |
| 14  | 2 | Learn drawing the Synoptic diagram For drains,ii                    | drawing the Synoptic diagram For canals               | white board                  | Monthly Exam |
| 15  | 2 | Second monthly exam                                                 |                                                       |                              |              |

### 11.Course Evaluation

| Evaluation type     | degree |
|---------------------|--------|
| First monthly exam  | 20     |
| Second monthly exam | 20     |
| Final exam          | 60     |
| total               | 100    |

### 12.Learning and Teaching Resources

|                                                                    |                                                                                                                             |
|--------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|
| Required textbooks (curricular books, if any)                      | Design Manual for Irrigation and Drainage, Pencil Engineering Consultants, London                                           |
| Main references (sources)                                          | Theory and Design of irrigation structures (vol.1 Varshney,R.S. ,Gupta,S.C. and Gupta, R. NEMCHAND BROS, ROORKEE,INDIA,1977 |
| Recommended books and references (scientific journals, reports...) |                                                                                                                             |
| Electronic References, Websites                                    | <a href="https://uclouvain.be/en-cours-2023-lbres2104">https://uclouvain.be/en-cours-2023-lbres2104</a>                     |

## Course Description Form

|                                                                            |                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                             |                        |                          |
|----------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|------------------------|--------------------------|
| <b>1. Course Name:</b>                                                     |                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                             |                        |                          |
| Estimation and engineering Specifications I                                |                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                             |                        |                          |
| <b>2. Course Code:</b>                                                     |                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                             |                        |                          |
| DWRE404                                                                    |                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                             |                        |                          |
| <b>3. Semester / Year:</b>                                                 |                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                             |                        |                          |
| 1/2025-2026                                                                |                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                             |                        |                          |
| <b>4. Description Preparation Date:</b>                                    |                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                             |                        |                          |
| 1/9/2025                                                                   |                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                             |                        |                          |
| <b>5. Available Attendance Forms:</b>                                      |                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                             |                        |                          |
| Theoretical lectures in class and lectures in the lab                      |                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                             |                        |                          |
| <b>6. Number of Credit Hours (Total) / Number of Units (Total)</b>         |                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                             |                        |                          |
| 3/3                                                                        |                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                             |                        |                          |
| <b>7. Course administrator's name (mention all, if more than one name)</b> |                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                             |                        |                          |
| Name: Mohammed A. khattab    Email: m.almukhttar@uomosul.edu               |                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                             |                        |                          |
| Name: Ahmed abdalhameed    Email: ahmed.abdal-hameed@uomosul.edu.iq        |                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                             |                        |                          |
| <b>8. Course Objectives</b>                                                |                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                             |                        |                          |
| <b>Course Objectives</b>                                                   |                                                                                                                                                                                                                                                                                                                                          | <p>In ENDWR404, initially students will learn how to estimation the quantities of materials for buildings and Earth works calculations for irregular cross-sections structural in additional structural drawing Upon successful completion of this course the student shall be able to:</p> <ol style="list-style-type: none"> <li>1. Knowing the types of estimation and its benefits <b>i</b></li> <li>2. Excavation <b>i</b></li> <li>3. Foundations, stripe and raft <b>i</b></li> <li>4. Cubed wall works and estimation of materials. <b>i</b></li> <li>5. Block building, bricks building, stone building <b>i</b></li> <li>6. Wood form works <b>i</b></li> <li>7. Analysis Reinforced of slabs <b>ii</b></li> <li>8. Analysis Reinforced of beams <b>ii</b></li> <li>9. Design and Draw (Map of house+ foundation map+ section in wall) <b>ii</b></li> <li>10. Design and Draw (Reinforced of slab map) <b>ii</b></li> <li>11. Design and Draw (Reinforced of beam map) <b>ii</b></li> <li>12. Design and Analysis of Finishing works <b>ii</b></li> </ol> |                             |                        |                          |
| <b>9. Teaching and Learning Strategies</b>                                 |                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                             |                        |                          |
| <b>Strategy</b>                                                            | The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering some challenging problems to motivate students. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                             |                        |                          |
| <b>10. Course Structure</b>                                                |                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                             |                        |                          |
| <b>Week</b>                                                                | <b>Hours</b>                                                                                                                                                                                                                                                                                                                             | <b>Required Learning Outcomes</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <b>Unit or subject name</b> | <b>Learning method</b> | <b>Evaluation method</b> |

|       |   |                                                                                                                         |                                                                                                                                                                                                                                                               |                                                       |           |
|-------|---|-------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|-----------|
| 1     | 3 | Knowing the types of estimation and its benefits (i)<br>Design and Draw Map of house (ii)                               | Introduction to Estimation and Materials Specification, Introduction; syllabus; Draw (house plan).                                                                                                                                                            | Theoretical lecture in class and lecture in the lab   | HW        |
| 2     | 3 | Excavation i<br>Design and Draw (foundation map+ section in wall) (ii)                                                  | Excavation of Foundations<br>Excavation of stripe and raft foundation, draw (elevations, sectional elevation, foundation plan, wall section).                                                                                                                 | Theoretical lecture in class and lecture in the lab   | HW        |
| 3-4   | 6 | Foundations, stripe and raft ( i)                                                                                       | Foundations<br>Estimation of (cement, sand, gravel) for stripe and raft foundation, draw (stair ways plan. reinforced of stair).<br>Estimation of steel reinforced<br>Estimation of steel reinforced for stripe and raft foundation, draw (slabs and beams ). | Theoretical lectures in class and lectures in the lab | HW & Exam |
| 5     | 3 | Cubed wall works and estimation of materials. (i)                                                                       | Cubed wall works<br>Cubed wall works and estimation of materials                                                                                                                                                                                              | Theoretical lectures in class                         | HW        |
| 6-8   | 6 | Block building, bricks building, stone building (i)                                                                     | Walls<br>stone building, bricks building, block building.<br>Bricks building<br>estimation of materials<br>Block building, estimation of materials                                                                                                            | Theoretical lectures in class                         | HW & Exam |
| 9-10  | 6 | Wood form works ( i)                                                                                                    | Wood form works<br>estimation of materials for wood form types                                                                                                                                                                                                | Theoretical lectures in class                         | HW & Exam |
| 11-13 | 6 | Learn the basics of designing surface (open) and subsurface (covered) drainage sections. (ii)                           | Design of drains' sections                                                                                                                                                                                                                                    | Theoretical lectures in class                         | HW & Exam |
| 11-13 | 6 | Analysis Reinforced of slabs (ii)<br>Analysis Reinforced of beams (ii)<br>Design and Draw (Reinforced of slab map) (ii) | Reinforced estimation of materials for reinforced of slab.<br>Reinforced of beams<br>estimation of materials for reinforced of beams,                                                                                                                         | Theoretical lectures in class and lectures in the lab | HW        |

|       |   |                                                            |                                                                      |                                  |    |
|-------|---|------------------------------------------------------------|----------------------------------------------------------------------|----------------------------------|----|
|       |   | Design and Draw<br>(Reinforced of beam<br>map) <b>(ii)</b> | draw (reinforced of<br>Structural<br>construction)                   |                                  |    |
| 14-15 | 6 | Design and Analysis of<br>Finishing works (ii)             | Finishing works<br>Estimation of<br>materials for<br>finishing works | Theoretical<br>lectures in class | HW |

### 11.Course Evaluation

| Evaluation type              | Degree |
|------------------------------|--------|
| H W & Sheets (each 1 pt)     | 10     |
| Two Monthly exam(each 10 pt) | 20     |
| Midterm Exam                 | 20     |
| Final Exam                   | 50     |
| Total                        | 100    |

### 12.Learning and Teaching Resources

|                                                                    |                                                                                                                                                                                        |
|--------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Required textbooks (curricular books, if any)                      | <ul style="list-style-type: none"> <li>VANZIRANI, V.N., CHANDOLA, S.P. "Civil Engineering Estimating and Costing ". first edition, 1982.</li> </ul>                                    |
| Main references (sources)                                          | <ul style="list-style-type: none"> <li>Civil Engineering and Costing, S.P. Mahajan, 624. 1042, M214.</li> <li>3. Estimating Building and Construction, 692.5, H816, 73-119.</li> </ul> |
| Recommended books and references (scientific journals, reports...) | -----                                                                                                                                                                                  |
| Electronic References, Websites                                    | -----                                                                                                                                                                                  |

## Course Description Form

|                                                                            |              |                                                                                                                                                                                                                                                                                                                                                                                                     |                                       |                                    |                          |
|----------------------------------------------------------------------------|--------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|------------------------------------|--------------------------|
| <b>1. Course Name:</b>                                                     |              |                                                                                                                                                                                                                                                                                                                                                                                                     |                                       |                                    |                          |
| Economic Sciences                                                          |              |                                                                                                                                                                                                                                                                                                                                                                                                     |                                       |                                    |                          |
| <b>2. Course Code:</b>                                                     |              |                                                                                                                                                                                                                                                                                                                                                                                                     |                                       |                                    |                          |
| DWRE 405                                                                   |              |                                                                                                                                                                                                                                                                                                                                                                                                     |                                       |                                    |                          |
| <b>3. Semester / Year:</b>                                                 |              |                                                                                                                                                                                                                                                                                                                                                                                                     |                                       |                                    |                          |
| 2025-2026                                                                  |              |                                                                                                                                                                                                                                                                                                                                                                                                     |                                       |                                    |                          |
| <b>4. Description Preparation Date:</b>                                    |              |                                                                                                                                                                                                                                                                                                                                                                                                     |                                       |                                    |                          |
| 1/9/2025                                                                   |              |                                                                                                                                                                                                                                                                                                                                                                                                     |                                       |                                    |                          |
| <b>5. Available Attendance Forms:</b>                                      |              |                                                                                                                                                                                                                                                                                                                                                                                                     |                                       |                                    |                          |
| Theoretical classroom lectures                                             |              |                                                                                                                                                                                                                                                                                                                                                                                                     |                                       |                                    |                          |
| <b>6. Number of Credit Hours (Total) / Number of Units (Total)</b>         |              |                                                                                                                                                                                                                                                                                                                                                                                                     |                                       |                                    |                          |
| 4/2                                                                        |              |                                                                                                                                                                                                                                                                                                                                                                                                     |                                       |                                    |                          |
| <b>7. Course administrator's name (mention all, if more than one name)</b> |              |                                                                                                                                                                                                                                                                                                                                                                                                     |                                       |                                    |                          |
| Name: Dr.Rasha M. Sami Email: :rasha.fadhil@uomosul.edu.iq                 |              |                                                                                                                                                                                                                                                                                                                                                                                                     |                                       |                                    |                          |
| <b>8. Course Objectives</b>                                                |              |                                                                                                                                                                                                                                                                                                                                                                                                     |                                       |                                    |                          |
| <b>Course Objectives</b>                                                   |              | Upon completion of this course, students will be able to: <ul style="list-style-type: none"> <li>Understand and apply the basic concepts of engineering economics (ii)</li> <li>Prepare an economic feasibility study (ii)</li> <li>Evaluate and analyze engineering projects economically (ii)</li> <li>Compare engineering alternatives to select the most feasible and efficient (ii)</li> </ul> |                                       |                                    |                          |
| <b>9. Teaching and Learning Strategies</b>                                 |              |                                                                                                                                                                                                                                                                                                                                                                                                     |                                       |                                    |                          |
| <b>Strategy</b>                                                            |              | The main strategy adopted in delivering this course is to encourage student participation in exercises while simultaneously improving and expanding their critical thinking skills. This will be achieved through interactive classroom and tutorials, and by exploring specific issues to motivate students.                                                                                       |                                       |                                    |                          |
| <b>10. Course Structure</b>                                                |              |                                                                                                                                                                                                                                                                                                                                                                                                     |                                       |                                    |                          |
| <b>Week</b>                                                                | <b>Hours</b> | <b>Required Learning Outcomes</b>                                                                                                                                                                                                                                                                                                                                                                   | <b>Unit or subject name</b>           | <b>Learning method</b>             | <b>Evaluation method</b> |
| 1                                                                          | 4            | Principles of Engineering Economics<br>Cash Path Diagram                                                                                                                                                                                                                                                                                                                                            | Fundamentals of Engineering Economics | Theoretical Lectures in Classroom, | Exam                     |
| 3-2                                                                        | 8            | Uniform annuity series, graduated annuity series, regular and effective interest rates, simple and compound interest                                                                                                                                                                                                                                                                                | Fundamentals of Engineering Economics | Theoretical Lectures Classroom,    | Exam                     |

|       |   |                                                   |                                                      |                                 |      |
|-------|---|---------------------------------------------------|------------------------------------------------------|---------------------------------|------|
| 5-4   | 8 | Evaluation and comparison of engineering projects | Present worth Method                                 | Theoretical Lectures Classroom, | Exam |
| 7-6   | 8 | Evaluation and comparison of engineering projects | Future worth method                                  | Theoretical Lectures Classroom, | Exam |
| 8     | 2 | Solve problems                                    |                                                      |                                 |      |
| 8     | 2 | Exam                                              |                                                      |                                 |      |
| 10-9  | 8 | Evaluation and comparison of engineering projects | Annual worth method                                  | Theoretical Lectures Classroom, | Exam |
| 11-12 | 8 | Economic Project Studies                          | Preparing an economic feasibility study for projects | Theoretical Lectures Classroom, | Exam |
| 14-13 | 8 | Project Management from a Financial Perspective   | Project pricing. Cash flow and advance forecasting.  | Theoretical Lectures Classroom, | Exam |
| 15    | 2 | Exam                                              |                                                      |                                 |      |
| 15    | 2 | Preparatory week before the final Exam            |                                                      |                                 |      |

### **Laboratory Experiments:**

| 11.Course Evaluation                                                                                                                                                                                                                                                                                    |                                                     |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|
| Evaluation type                                                                                                                                                                                                                                                                                         | degree                                              |
| Monthly exam:                                                                                                                                                                                                                                                                                           | 20                                                  |
| Semester exam:                                                                                                                                                                                                                                                                                          | 20                                                  |
| Final exam:                                                                                                                                                                                                                                                                                             | 60                                                  |
| Total: 100                                                                                                                                                                                                                                                                                              | 100                                                 |
| 12.Learning and Teaching Resources                                                                                                                                                                                                                                                                      |                                                     |
| <ul style="list-style-type: none"> <li>• Engineering Economy (7th ed.), L. Blank and A. Tarquin (2012), McGraw-Hill .</li> <li>• Water Resources Systems Planning and Management, S.K. Jain and V.P. Singh (2003), Elsevier.</li> <li>• Water Resources Handbook for Economics, NRCS .(1998)</li> </ul> | Engineering Economic Analysis, Oxford, New York,200 |

## Course Description Form

|                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                   |                             |                        |                          |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|-----------------------------|------------------------|--------------------------|
| <b>1. Course Name</b>                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                   |                             |                        |                          |
| Dams Engineering I                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                   |                             |                        |                          |
| <b>2. Course Code:</b>                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                   |                             |                        |                          |
| DWRE 406                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                   |                             |                        |                          |
| <b>3. Semester / Year</b>                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                   |                             |                        |                          |
| Fall semester / 2025-2026                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                   |                             |                        |                          |
| <b>4. Description Preparation Date</b>                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                   |                             |                        |                          |
| 1/9/2025                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                   |                             |                        |                          |
| <b>5. Available Attendance Forms:</b>                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                   |                             |                        |                          |
| Theoretical lectures in class                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                   |                             |                        |                          |
| <b>6. Number of Credit Hours (Total) / Number of Units (Total)</b>                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                   |                             |                        |                          |
| 60/4                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                   |                             |                        |                          |
| <b>7. Course administrator's name (mention all, if more than one name)</b>                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                   |                             |                        |                          |
| Name: Dr. Sahar Sameer Younus<br>Email: <a href="mailto:s.alhilali@uomosul.edu.iq">s.alhilali@uomosul.edu.iq</a><br>Name: Ali Ahmed Abdulmawjood<br>Email: aliabdulmawjood@uomosul.edu.iq |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                   |                             |                        |                          |
| <b>8. Course Objectives</b>                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                   |                             |                        |                          |
| <b>Course Objectives</b>                                                                                                                                                                  | <ul style="list-style-type: none"> <li>An ability to specify the type of gravity dam according to the conditions of valley. (ii)</li> <li>An ability to analyses the forces that affected to gravity (ii)</li> <li>An ability to identify the solutions for the problems that may be appear in the analyses of gra dams. (ii)</li> <li>An ability to specify the type of arch dam according to the conditions of valley. (ii)</li> <li>Formulate a preliminary design of gravity base on the chosen type. (ii)</li> <li>Formulate a preliminary design of arch Dams base on the chosen type. (ii)</li> </ul>                                                                                                                                                       |                                   |                             |                        |                          |
| <b>9. Teaching and Learning Strategies</b>                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                   |                             |                        |                          |
| <b>Strategy</b>                                                                                                                                                                           | The aim of this course is to present number of sessions during fifteen weeks. These sessions include different subjects are introduced to the students. The fourth-class students should be awareness about the hydrological aspects which related to the hydraulic designs of dams. The objectives of dams and reservoirs construction are explained in detail. This course will cover different subjects related to the design of gravity and arch dams. These subjects are types of gravity and arch dams, types of foundation, modes of failure in gravity dams, Design of gravity dams, in addition to the analyses all of the forces and stresses which effected to the body of the dam with taking into consideration the specificity of each type of dams. |                                   |                             |                        |                          |
| <b>10. Course Structure</b>                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                   |                             |                        |                          |
| <b>Week</b>                                                                                                                                                                               | <b>Hours</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <b>Required Learning Outcomes</b> | <b>Unit or subject name</b> | <b>Learning method</b> | <b>Evaluation method</b> |

|   |   |                                                                                                                                                         |                             |                               |              |
|---|---|---------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|-------------------------------|--------------|
| 2 | 4 | Introduction to Dam Engineering, Storage Works, Hydrological Aspects, Geological Investigations, Reservoir Site Selection, Storage Zones of a Reservoir | Hydrological aspects of dam | Theoretical lectures in class | Exame        |
| 2 | 4 | Reservoir Storage Capacity Estimation, Live Storage (Tabulation Method), Sequent Peaks Analysis, Optimization Analysis)                                 | Reservoir Storage Capacity  | Theoretical lectures in class | HW and Exame |
| 1 | 2 | Reservoir Sedimentation                                                                                                                                 | Reservoir Sedimentation     | Theoretical lectures in class | HW and Exame |
| 1 | 2 | The probable life of the reservoir                                                                                                                      |                             | Theoretical lectures in class | HW and Exame |
| 1 | 2 | Classification of dams, Factors governing the selection of a particular type of dam                                                                     | Classification of dams      | Theoretical lectures in class | Exame        |
| 1 | 2 | Gravity dams (Advantages, Disadvantages)                                                                                                                | Gravity dams                | Theoretical lectures in class | Exame        |
| 1 | 2 | Gravity dams (Modes of failure and criteria for structural stability of gravity dam)                                                                    | Gravity dams                | Theoretical lectures in class | Exame        |
| 1 | 2 | Gravity dams (Principles and stresses)                                                                                                                  | Gravity dams                | Theoretical lectures in class | HW and Exame |
| 1 | 2 | Elementary profile of the gravity dam (Design considerations) (Stresses development in an elementary profile)                                           | Gravity dams                | Theoretical lectures in class | HW and Exame |
| 2 | 4 | Arch dams                                                                                                                                               | Arch dams                   | Theoretical lectures in class | HW and Exame |

### 11.Course Evaluation

|            |        |
|------------|--------|
| 1 quizzes  | 10pts  |
| 2 homework | 10pts  |
| Term Exam  | 20pts  |
| Final Exam | 60pts  |
| Total      | 100pts |

### 12.Learning and Teaching Resources

|                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|--------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Required textbooks (curricular books, if any)                      | 1. Hydraulics of Dams and Reservoirs, By: Fuat Senturk, W<br>Resources Publications, Colorado, U.S.A.,1994.<br>2. Theory and Design of Irrigation Structures, Vol. II, By: R<br>Varshney, S. C. Gupta and R. L. Gupta, Nem Chand & Bros, Ro<br>(U.P.), India,1982.<br>3. Earth-Rock Dams, Engineering Problems of Design<br>Construction, By: J. L. Sherard, R. J. Woodward, S. F. Gizienske<br>W. A. Clevenger, John Wiley and Sons, Inc., New York, 1963.<br>4. Engineering for Dams, By: W. P. Greager, J. D. Justin and J. Hi<br>In three Volumes, John Wiley and Sons, Inc., New York, 1961. |
| Main references (sources)                                          | -----                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Recommended books and references (scientific journals, reports...) | Loucks, D. P., Van Beek, E., Stedinger, J. R., Dijkman, J. P., and Vil<br>M. T. (2005). Water Resources Systems Planning and Management<br>Introduction to Methods, Models and Applications. Paris, UNESCO                                                                                                                                                                                                                                                                                                                                                                                        |
| Electronic References, Websites                                    | <a href="https://classroom.google.com/c/ODA5Nzg0MTYwODg2">https://classroom.google.com/c/ODA5Nzg0MTYwODg2</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

## Course Description Form

|                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>1. Course Name:</b>                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Foundation Engineering I                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>2. Course Code:</b>                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| DWRE407                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>3. Semester / Year:</b>                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| The first course/ 2025 -2026                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>4. Description Preparation Date:</b>                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 1/9/2025                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>5. Available Attendance Forms:</b>                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Class lectures + Electronic lectures                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>6. Number of Credit Hours (Total) / Number of Units (Total)</b>                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 30 hours/ 2 credits                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>7. Course administrator's name (mention all, if more than one name)</b>                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Name: I. M. A. Al-kiki                      Email: i.alkiki@uomosul.edu.iq<br>Dr.Mohammed M. Khalaf      Email: mohammedmukhlifkhalaf@uomosul.edu.iq |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>8. Course Objectives</b>                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Course Objectives</b>                                                                                                                             | <b>The optimal, good, economical and safe design of engineering pedestrian foundations (surface foundations) in terms of the student's familiarity with:</b> <ul style="list-style-type: none"> <li>Soil investigations and exploration to choose the appropriate (foundation type, foundation depth, foundation dimensions, foundation shape).</li> <li>Analysis and distribution of stresses under foundations.</li> <li>Subsidence and joining under foundations.</li> <li>Soil bearing capacity.</li> </ul> <b>• Analysis and design of retaining walls.</b> |
| <b>9. Teaching and Learning Strategies</b>                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

|                 |                                                                                                                                                                                                                                                                                                                                          |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Strategy</b> | The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering some challenging problems to motivate students. |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## 10. Course Structure

| Week    | Hours | Required Learning Outcomes                                                                        | Unit or subject name                                                               | Learning method  | Evaluation method                |
|---------|-------|---------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|------------------|----------------------------------|
| 1       | 2     | Defining foundation geometry and knowing the type of foundations                                  | Introduction and general information                                               | Lecture in class | Class discussions                |
| 2       | 2     | Explaining the purpose of soil investigations and the methods used                                | Soil investigation and description                                                 | Lecture in class | My class and homework assignment |
| 4 + 3   | 4     | The ability to distribute stresses under foundations and know the amount of subsidence under them | Stress distribution, Settlement and consolidation estimation below the foundations | Lecture in class | Daily exam                       |
| 6 + 5   | 4     | Knowing the problems of different types of soils under foundations and how to address them        | Foundation on the expansive , collapse and rock soils                              | Lecture in class | My class and homework assignment |
| 7       | 2     | Ability to calculate lateral pressure of soil                                                     | Lateral earth pressure                                                             | Lecture in class | Class discussions                |
| 9 + 8   | 4     | Ability to analyze and design retaining walls                                                     | Retaining walls                                                                    | Lecture in class | First course examination No.1    |
| 10      | 2     | Know the concept of soil bearing capacity                                                         | Bearing capacity of the soil                                                       | Lecture in class | Class discussions                |
| 11 + 12 | 4     | Knowledge of methods for calculating soil bearing capacity                                        | Methods of bearing capacity determinations                                         | Lecture in class | My class and homework assignment |
| 13      | 2     | Knowledge of analysis and design of foundations on clay and plastic silty soils                   | Foundation on clayey soil and plastic silt soil                                    | Lecture in class | Daily exam                       |
| 14      | 2     | Knowledge of analysis and design of foundations on sandy soil and non-plastic silt                | Foundation on sandy soil and non-plastic silt soil                                 | Lecture in class | My class and homework assignment |
| 15      | 2     | Knowledge of analysis and design of foundations on rocky soil                                     | Foundation on rock                                                                 | Lecture in class | First course examination No.2    |

## 11.Course Evaluation

| Evaluation type                  | Degree |
|----------------------------------|--------|
| Homework, classwork, reports (6) | 6      |
| Quizzes (2)                      | 8      |
| Term exam (2)                    | 24     |
| Final exam                       | 60     |
| Total                            | 100    |

## 12.Learning and Teaching Resources

|                                               |                                                                                          |
|-----------------------------------------------|------------------------------------------------------------------------------------------|
| Required textbooks (curricular books, if any) | - الشكرجي ، يوسف والمحمدي، نوري، " هندسة الأسس " ،<br>جامعة بغداد ، الطبعة الاولى، 1985  |
| Main references (sources)                     | -Das, B. M., "Principle of Foundation Engineering", Thomson Books/Cole, California State |

|                                                                    |                                                                                                                                                                                                                                                                                                                                                                                        |
|--------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                    | University, Sacramento, 5th ed., 2004.<br>- Peak, R. B., Hanson, W. E. and Thorburn, T.H., " Foundation Engineering ", John Wiley and Sons, 2nd ed., 1974<br>- Bowles, J.E., P.E., S.E." Foundation Analyses and Design ", The McGraw-Hill Companies, Inc, 5th ed., 2006.<br>-Das, B. M., & Sivakugan, N.," Principles of foundation engineering", Cengage learning, 2018.             |
| Recommended books and references (scientific journals, reports...) | 11. Al-Rafidain Engineering Journal.<br>12. Highway Research Record , H R R.<br>13. Journal of the Geo technical engineering Division , ASCE.<br>14. Journal of Soil Mechanics and Foundation Division, Proc. ASCE.<br>15. Transportation Research Record , TRR.<br>16. Journal of the Japan Society of Civil Engineering , JSCE.<br>17. The Quarterly Journal of Engineering Geology. |
| Electronic References, Websites                                    | None                                                                                                                                                                                                                                                                                                                                                                                   |

### Course Description Form

|                                                                     |                                                                                                                                                    |
|---------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Course Name:                                                     |                                                                                                                                                    |
| Design of Hydraulic Structures II                                   |                                                                                                                                                    |
| 2. Course Code:                                                     |                                                                                                                                                    |
| DWR 446                                                             |                                                                                                                                                    |
| 3. Semester / Year:                                                 |                                                                                                                                                    |
| 2/ 2025-2026                                                        |                                                                                                                                                    |
| 4. Description Preparation Date:                                    |                                                                                                                                                    |
| 1/2/2026                                                            |                                                                                                                                                    |
| 5. Available Attendance Forms:                                      |                                                                                                                                                    |
| In-person and electronic (Google Classroom - 52yqcxag)              |                                                                                                                                                    |
| 6. Number of Credit Hours (Total) / Number of Units (Total)         |                                                                                                                                                    |
| 4/3                                                                 |                                                                                                                                                    |
| 7. Course administrator's name (mention all, if more than one name) |                                                                                                                                                    |
| Name: Nashwan Kamal Aldeen Mohammed                                 |                                                                                                                                                    |
| Email: nashwan.alomari@uomosul.edu.iq                               |                                                                                                                                                    |
| 8. Course Objectives                                                |                                                                                                                                                    |
| Course Objectives                                                   | <ul style="list-style-type: none"> <li>To identify the canal headwork, its use, and perform barrage design steps and requirements. (ii)</li> </ul> |

|  |                                                                                                                                                                                                                                                                                                                                                                                   |
|--|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <ul style="list-style-type: none"> <li>• To understand the importance of using channel transitions and develop the ability to design a transition. (ii)</li> <li>• To be able to design a syphon structure (as a sample of cross drainage works). (ii)</li> <li>• To understand and be able to design some hydraulic structures (culverts and Sharda-type falls). (ii)</li> </ul> |
|--|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## 9. Teaching and Learning Strategies

|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Strategy</b> | <p>The primary strategy for delivering this module will be to encourage students' participation in class while refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials, and practical design of the hydraulic structures.</p> <p>PowerPoint presentations and boards are used in the classroom. Examples of problems will be solved and illustrated on the classroom board. Tutorials are organized to establish closer contact with students.</p> |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## 10. Course Structure

| Week              | Hours | Required Learning Outcomes                                                                                                                                                                                                                                     | Unit or subject name                                                                                                                     | Learning method           | Evaluation method                  |
|-------------------|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|------------------------------------|
| 1, 2, 3, 4, and 5 | 20    | Develop the ability of the students to solve design problems and analyze the data to evaluate the feasibility of components of the canal headwork (barrage types). In addition, assess and analyze the safety of the canal headwork structure (barrage types). | Design of canal structures (canal head work).                                                                                            | Presentation & whiteboard | Quiz, Assignment, and monthly exam |
| 6, and 7          | 8     | Develop students' ability to solve design problems and analyze data to evaluate types of flow transition.                                                                                                                                                      | Transition. Introduction of transitions (R.S Chaturvedi's, Mitra's, and Hind's transitions). Design of transitions (Hind's transitions). | Presentation & whiteboard | Assignment                         |
| 8, 9, and 10      | 12    | Develop the ability of the students to solve design problems and analyze the data to evaluate the cross                                                                                                                                                        | Cross drainage works.                                                                                                                    | Presentation & whiteboard | Quiz and Assignment                |

|                           |           |                                                                     |                                                            |                           |           |
|---------------------------|-----------|---------------------------------------------------------------------|------------------------------------------------------------|---------------------------|-----------|
|                           |           | drainage works (Design example of a syphon).                        |                                                            |                           |           |
| <b>11, 12, 13, and 14</b> | <b>16</b> | Develop the ability of the students to design of the culvert        | Culvert. Introduction and design example of the culvert.   | Presentation & whiteboard | Term exam |
| <b>15</b>                 | <b>4</b>  | Develop and solve the design of the canal falls (Sharda-type fall). | Canal Falls. Design of the canal falls (Sharda-type fall). | Presentation & whiteboard |           |

### 3. Course Evaluation

| <b>Evaluation type</b>                    | <b>Degree</b> |
|-------------------------------------------|---------------|
| Quizzes + class work + H.W (If requested) | 12            |
| Monthly Exam                              | 12            |
| Term Exam                                 | 16            |
| Final Exam                                | 60            |
| Total                                     | 100           |

### 4. Learning and Teaching Resources

|                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|--------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Required textbooks (curricular books, if any)                      | Varshney, R.S., Gupta, S. C., Gupta, R. L., (1979) " <i>Theory &amp; design of irrigation structures</i> ". Nem Chand & Bros; Roorkee, India.                                                                                                                                                                                                                                                                                                                                                             |
| Main references (sources)                                          | 5. Asawa, G. L. (2008) " <i>Irrigation and Water Resources Engineering</i> " New age International(P) Limited, Publishers.<br>6. Chanson, Hubert., (2004) " <i>The Hydraulics of Open Channel Flow: An Introduction</i> " Elsevier.<br>7. Chow, Ven te., (1959) " <i>Open Channels Hydraulics</i> " Mc Graw Hill.<br>8. Schall, J.D., Thompson, p. L., Zeryes, S. M., Kilgore, R. T., and Morris, J. L. (2012) " <i>Hydraulic design of Highway culverts</i> " ( Report No . FHWA – HIF – 12 – 026 HD55). |
| Recommended books and references (scientific journals, reports...) | None                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Electronic References, Websites                                    | None                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

1. Course Name:

Design of Sprinkler and Drip Irrigation Systems

2. Course Code:

| DWR 410                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |      |                                                                                                                                                                                           |                                        |                   |
|----------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|-------------------|
| 3. Semester / Year:                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |      |                                                                                                                                                                                           |                                        |                   |
| Fall/ 2025-2026                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |      |                                                                                                                                                                                           |                                        |                   |
| 4. Description Preparation Date:                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |      |                                                                                                                                                                                           |                                        |                   |
| 15-3-2025                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |      |                                                                                                                                                                                           |                                        |                   |
| 5. Available Attendance Forms:                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |      |                                                                                                                                                                                           |                                        |                   |
| In person                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |      |                                                                                                                                                                                           |                                        |                   |
| 6. Number of Credit Hours (Total) / Number of Units (Total)                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |      |                                                                                                                                                                                           |                                        |                   |
| 3/3                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |      |                                                                                                                                                                                           |                                        |                   |
| 7. Course administrator's name (mention all, if more than one name)                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |      |                                                                                                                                                                                           |                                        |                   |
| Name: Dr. Zeyad Ayoob Sulaiman, Mr. Muaad Majid Klekan<br>Email: z.alsinjarii@uomosul.edu.iq |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |      |                                                                                                                                                                                           |                                        |                   |
| 8. Course Objectives                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |      |                                                                                                                                                                                           |                                        |                   |
| Course Objective                                                                             | Students who successfully complete this course have: <ol style="list-style-type: none"> <li>1. Learned characteristics of sprinkler and drip irrigation systems, (i)</li> <li>2. Understood economics of irrigation, (i)</li> <li>3. Able to design various types of pressurized irrigation systems after collecting the required design data and analyzing these data in a way that suits the design, (i) and (ii)</li> <li>4. Able to select a suitable irrigation system for a given situation, (ii)</li> <li>5. able to select the most economical irrigation design alternative, (vi)</li> </ol> |      |                                                                                                                                                                                           |                                        |                   |
| 9. Teaching and Learning Strategies                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |      |                                                                                                                                                                                           |                                        |                   |
| Strategy                                                                                     | Power point presentation Lecture. Handouts, Field trip and y tubes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |      |                                                                                                                                                                                           |                                        |                   |
| 10. Course Structure                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |      |                                                                                                                                                                                           |                                        |                   |
| Week                                                                                         | Hours                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | L. O | Unit or subject name                                                                                                                                                                      | Learning method                        | Evaluation method |
| 1                                                                                            | 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | i    | Sprinkler irrigation<br>Sprinkler irrigation basic concept<br>Advantages and problems of sprinkler irrigation<br>Basic and supplementary components Types of sprinkler irrigation systems | Powerpoint<br>Whiteboard<br>discussion | H.W               |
| 2                                                                                            | 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | i    | Fundamentals of sprinkler irrigation<br>Single sprinkler water distribution<br>Layout of stationary system/Hydraulic of sprinkler nozzle                                                  | Powerpoint<br>Whiteboard<br>discussion | exam              |
| 3                                                                                            | 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | i    | Uniformity of sprinkler water distribution                                                                                                                                                | Powerpoint<br>Whiteboard<br>discussion | H.W               |
| 4                                                                                            | 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | i&ii | Alternate setting of sprinkler laterals<br>Sprinkler spray losses<br>sprinkler irrigation efficiency                                                                                      | Powerpoint<br>Whiteboard<br>discussion | exam              |
| 5                                                                                            | 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | i&ii | Sprinkler lateral pipes<br>Fundamentals of flow hydraulic pipes<br>Allowable pressure variation /Sprinkler pipe size                                                                      | Powerpoint<br>Whiteboard<br>discussion | exam              |

|    |   |            |                                                                                                                                                     |                                        |      |
|----|---|------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|------|
| 6  | 4 | ii         | Friction head loss/Layout of sprinkler pipes<br>Moving and operation sprinkler pipes<br>Sprinkler pipe material                                     | Powerpoint<br>Whiteboard<br>doscussion | exam |
| 7  | 4 | ii         | Sprinkler irrigation major pipes distribution system<br>Types of major pipes distribution system<br>Design requirements/ Distribution system layout | Powerpoint<br>Whiteboard<br>doscussion | H.W  |
| 8  | 4 | ii         | Design methods (flow velocity method, allowable friction method, economic analysis method)                                                          | Powerpoint<br>Whiteboard<br>doscussion | exam |
| 9  | 4 | ii         | Economic analysis general procedure<br>Total dynamic head                                                                                           | Powerpoint<br>Whiteboard<br>doscussion | exam |
| 10 | 4 | vi         | Applications on design of main pipe systems                                                                                                         | Powerpoint<br>Whiteboard<br>doscussion | exam |
| 11 | 4 | ii         | Trickle irrigation<br>Advantages and problems of drip irrigation<br>Trickle system basic component<br>Soil-water-crop factors                       | Powerpoint<br>Whiteboard<br>doscussion | H.W  |
| 12 | 4 | i&ii       | Emitters selection/Hydraulic of trickle network                                                                                                     | Powerpoint<br>Whiteboard<br>doscussion | exam |
| 13 | 4 | vi         | General notes about evaluation of on- farm irrigation systems                                                                                       | Powerpoint<br>Whiteboard<br>doscussion | H.W  |
| 14 | 4 | vi         | Applications of Drip Irrigations                                                                                                                    | Powerpoint<br>Whiteboard<br>doscussion | exam |
| 15 | 4 | I,ii<br>vi | Final Exam                                                                                                                                          |                                        | Exam |

### 11.Course Evaluation

|                        |       |
|------------------------|-------|
| Four Exams, (each 3pt) | 12pt  |
| Midterm Exam           | 20pt  |
| Homework               | 8 pt  |
| Final Exam             | 60pt  |
| Total                  | 100pt |

### 12.Learning and Teaching Resources

|                                                                    |                                                                                                                                             |
|--------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| Required textbooks (curricular books, if any)                      | On-farm irrigation systems engineering\by A.Y.Hachum, and H.I.Yasin. textbook- M University,1992.                                           |
| Main references (sources)                                          | Recahrd H. Cuenca Irrigation System Design: An Engineering Approach, 1989.                                                                  |
| Recommended books and references (scientific journals, reports...) |                                                                                                                                             |
| Electronic Websites                                                | <a href="https://www.youtube.com/channel/UCg_SvLC7LCRLmVtTAp'yLA/videos">https://www.youtube.com/channel/UCg_SvLC7LCRLmVtTAp'yLA/videos</a> |

## Course Description Form

1. Course Name:

| Design of irrigation and drainage networks II                                                                                                                                                                                      |       |                                                                                                                                                                                                                                                                                                           |                                  |                              |                   |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|------------------------------|-------------------|
| 2. Course Code:                                                                                                                                                                                                                    |       |                                                                                                                                                                                                                                                                                                           |                                  |                              |                   |
| DWRE 411                                                                                                                                                                                                                           |       |                                                                                                                                                                                                                                                                                                           |                                  |                              |                   |
| 3. Semester / Year:                                                                                                                                                                                                                |       |                                                                                                                                                                                                                                                                                                           |                                  |                              |                   |
| second 2025-2026                                                                                                                                                                                                                   |       |                                                                                                                                                                                                                                                                                                           |                                  |                              |                   |
| 4. Description Preparation Date:                                                                                                                                                                                                   |       |                                                                                                                                                                                                                                                                                                           |                                  |                              |                   |
| 16/10/2025                                                                                                                                                                                                                         |       |                                                                                                                                                                                                                                                                                                           |                                  |                              |                   |
| 5. Available Attendance Forms:                                                                                                                                                                                                     |       |                                                                                                                                                                                                                                                                                                           |                                  |                              |                   |
| Lectures and Tutorials                                                                                                                                                                                                             |       |                                                                                                                                                                                                                                                                                                           |                                  |                              |                   |
| 6. Number of Credit Hours (Total) / Number of Units (Total)                                                                                                                                                                        |       |                                                                                                                                                                                                                                                                                                           |                                  |                              |                   |
| 3 hr/2 credits                                                                                                                                                                                                                     |       |                                                                                                                                                                                                                                                                                                           |                                  |                              |                   |
| 7. Course administrator's name (mention all, if more than one name)                                                                                                                                                                |       |                                                                                                                                                                                                                                                                                                           |                                  |                              |                   |
| Name: Azza Nasralla Jaralla Al-Talib<br>Email: <a href="mailto:a.atalib@uomosul.edu.iq">a.atalib@uomosul.edu.iq</a><br>Abdul Ghani Khalaf Muhammad<br><a href="mailto:alrobaai1982@uomosul.edu.iq">alrobaai1982@uomosul.edu.iq</a> |       |                                                                                                                                                                                                                                                                                                           |                                  |                              |                   |
| 8. Course Objectives                                                                                                                                                                                                               |       |                                                                                                                                                                                                                                                                                                           |                                  |                              |                   |
| Course Objectives                                                                                                                                                                                                                  |       | <ul style="list-style-type: none"> <li>• Inform students about design of lined canals ii</li> <li>• Inform students about design of drains ii</li> <li>• Lear drawing the longitudinal section for canals and drains i,ii</li> <li>• Lear drawing the cross section for canals and drains i,ii</li> </ul> |                                  |                              |                   |
| 9. Teaching and Learning Strategies                                                                                                                                                                                                |       |                                                                                                                                                                                                                                                                                                           |                                  |                              |                   |
| Strategy                                                                                                                                                                                                                           |       | The strategy is to provide theoretical lectures using presentations and question solving in an interactive way with students inside the classroom, as well as tutorials exercises.                                                                                                                        |                                  |                              |                   |
| 10. Course Structure                                                                                                                                                                                                               |       |                                                                                                                                                                                                                                                                                                           |                                  |                              |                   |
| Week                                                                                                                                                                                                                               | Hours | Required Learning Outcomes                                                                                                                                                                                                                                                                                | Unit or subject name             | Learning method              | Evaluation method |
| 1                                                                                                                                                                                                                                  | 2     | Inform students about the design of lined canals                                                                                                                                                                                                                                                          | Canal lining                     | Presentation And white board | Monthly exam      |
| 2                                                                                                                                                                                                                                  | 2     | Inform students about the design of lined canals                                                                                                                                                                                                                                                          | Joints of lined canals           | Presentation And white board | Monthly exam      |
| 3                                                                                                                                                                                                                                  | 2     | Inform students about the design of lined canals                                                                                                                                                                                                                                                          | Hydraulic Design of lined canals | Presentation And white board | Monthly exam      |
| 4&5                                                                                                                                                                                                                                | 4     | Inform students about the design of lined canals                                                                                                                                                                                                                                                          | Corner trapezoidal section       | Presentation And white board | Monthly exam      |
| 6                                                                                                                                                                                                                                  | 2     | Inform students about types of drains                                                                                                                                                                                                                                                                     |                                  | Presentation And white board | Monthly Exam      |
| 7                                                                                                                                                                                                                                  | 2     | First monthly exam                                                                                                                                                                                                                                                                                        |                                  |                              |                   |

|       |   |                                                              |                                   |                              |              |
|-------|---|--------------------------------------------------------------|-----------------------------------|------------------------------|--------------|
| 8&9   | 4 | Inform students about drains                                 | Design of open drains             | Presentation And white board | Monthly Exam |
| 10&11 | 2 | Learn drawing the longitudinal section for canals and drains | Longitudinal section              | white board                  | Monthly Exam |
| 12&13 | 2 | Learn drawing the cross-section for canals and drains        | Cross section                     | white board                  | Monthly Exam |
| 14    | 2 | Learn drawing the cross section for canals and drains        | Calculate cut and Fill quantities | white board                  | Monthly Exam |
| 15    | 2 | Second monthly exam                                          |                                   |                              |              |

### 11.Course Evaluation

| Evaluation type     | degree |
|---------------------|--------|
| First monthly exam  | 20     |
| Second monthly exam | 20     |
| Final exam          | 60     |
| total               | 100    |

### 12.Learning and Teaching Resources

|                                                                    |                                                                                                                             |
|--------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|
| Required textbooks (curricular books, if any)                      | Design Manual for Irrigation and Drainage, Pencil Engineering Consultants, London                                           |
| Main references (sources)                                          | Theory and Design of irrigation structures (vol.1 Varshney,R.S. ,Gupta,S.C. and Gupta, R. NEMCHANI BROS, ROORKEE,INDIA,1977 |
| Recommended books and references (scientific journals, reports...) |                                                                                                                             |
| Electronic References, Websites                                    | <a href="https://uclouvain.be/en-cours-2023-lbres2104">https://uclouvain.be/en-cours-2023-lbres2104</a>                     |

## Course Description Form

|                                                                     |
|---------------------------------------------------------------------|
| 1. Course Name:                                                     |
| Estimation and engineering specifications II                        |
| 2. Course Code:                                                     |
| DWRE404                                                             |
| 3. Semester / Year:                                                 |
| 2/2025-2026                                                         |
| 4. Description Preparation Date:                                    |
| 1/9/2025                                                            |
| 5. Available Attendance Forms:                                      |
| Theoretical lectures in class and lectures in the lab               |
| 6. Number of Credit Hours (Total) / Number of Units (Total)         |
| 3/3                                                                 |
| 7. Course administrator's name (mention all, if more than one name) |
| Name: Mohammed A. khatta Email: m.almukhtar@uomosul.edu.iq          |

## 8. Course Objectives

|                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Course Objectives</b> | <p>In ENDWR404, initially students will learn how to estimation the quantities of materials for buildings and Earth works calculations for irregular cross-sections structural in additional structural drawing Upon successful completion of this course the student shall be able to:</p> <ol style="list-style-type: none"> <li>1. Structural Buildings ii</li> <li>2. Understanding Foundation Types, with a Focus on Strip and Mat Foundations i</li> <li>3. Analysis of Reinforced Ceilings and Reinforced Bridges ii</li> <li>4. Retaining Walls ii</li> <li>5. Water Tanks ii</li> <li>6. Hydraulic Structures ii</li> <li>7. Canals ii</li> <li>8. Design and Drawing (Structural Building Map + Foundation Map + Columns) ii</li> <li>9. Retaining Walls ii</li> <li>10. Tanks ii</li> <li>11. Steel Structures (Frames) ii</li> <li>12. Hydraulic Structures ii</li> </ol> |
|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## 9. Teaching and Learning Strategies

|                 |                                                                                                                                                                                                                                                                                                                                          |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Strategy</b> | The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering some challenging problems to motivate students. |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## 10. Course Structure

| Week | Hours | Required Learning Outcomes                                                                     | Unit or subject name                                                                                                                                                                           | Learning method                                       | Evaluation method |
|------|-------|------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|-------------------|
| 1    | 3     | Knowing the types of buildings ((ii                                                            | Introduction to structural buildings, drawing (structural building plan).                                                                                                                      | Theoretical lecture in class and lecture in the lab   | HW                |
| 2    | 3     | Estimating the quantities of earthworks. (i) Design and drawing (base map + wall section) ((ii | Foundation Excavation Excavating strip and mat foundations, drawing (elevation view, sectional elevation view, foundation plan view, wall section).                                            | Theoretical lecture in class and lecture in the lab   | HW                |
| 3-4  | 6     | Knowing the types of foundations and focusing on strip and mat foundations. (i)                | Foundations Estimating (cement, sand, and gravel) for strip and raft foundations Estimating the quantity of reinforcing steel for strip and raft foundations. Drawing a reinforcement diagram. | Theoretical lectures in class and lectures in the lab | HW & Exam         |

|       |   |                                                                                                                                                                               |                                                                                                                                 |                                                       |           |
|-------|---|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|-----------|
| 5     | 3 | Analysis of Reinforced Ceilings ii<br>Analysis of Reinforced Bridges ii Design and Drawing (Ceiling Reinforcement Map) ii<br>Design and Drawing (Bridge Reinforcement Map) ii | Estimating materials required for reinforced ceilings.<br>Estimating materials for bridges and drawing (reinforcement diagram). | Theoretical lectures in class                         | HW        |
| 6-8   | 6 | Retaining walls ii                                                                                                                                                            | Estimating the materials needed for the work and drawing a painting on the subject                                              | Theoretical lectures in class                         | HW & Exam |
| 9-10  | 6 | Tanks ii                                                                                                                                                                      | Estimating the materials needed for the work and drawing a painting on the subject                                              | Theoretical lectures in class                         | HW & Exam |
| 11-13 | 6 | Steel structures ii                                                                                                                                                           | Estimating the materials needed for the work and drawing a painting on the subject                                              | Theoretical lectures in class and lectures in the lab | HW        |
| 14-15 | 6 | Hydraulic structures ii                                                                                                                                                       | Estimating the materials needed for the work and drawing a painting on the subject                                              | Theoretical lectures in class                         | HW        |

### 11.Course Evaluation

| Evaluation type              | Degree |
|------------------------------|--------|
| H W & Sheets (each 1 pt)     | 10     |
| Two Monthly exam(each 10 pt) | 20     |
| Midterm Exam                 | 20     |
| Final Exam                   | 50     |
| Total                        | 100    |

### 12.Learning and Teaching Resources

|                                                                    |                                                                                                                                                                                        |
|--------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Required textbooks (curricular books, if any)                      | <ul style="list-style-type: none"> <li>VANZIRANI, V.N., CHANDOLA, S.P. "Civil Engineering Estimating and Costing ". first edition, 1982.</li> </ul>                                    |
| Main references (sources)                                          | <ul style="list-style-type: none"> <li>Civil Engineering and Costing, S.P. Mahajan, 624. 1042, M214.</li> <li>3. Estimating Building and Construction, 692.5, H816, 73-119.</li> </ul> |
| Recommended books and references (scientific journals, reports...) | -----                                                                                                                                                                                  |
| Electronic References, Websites                                    | -----                                                                                                                                                                                  |

## Course Description Form

|                        |
|------------------------|
| 1. Course Name:        |
| Engineering Management |

| 2. Course Code:                                                     |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                 |                               |                   |
|---------------------------------------------------------------------|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|-------------------------------|-------------------|
| DWRE 413                                                            |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                 |                               |                   |
| 3. Semester / Year:                                                 |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                 |                               |                   |
| 2/2025-2026                                                         |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                 |                               |                   |
| 4. Description Preparation Date:                                    |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                 |                               |                   |
| 1/9/2025                                                            |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                 |                               |                   |
| 5. Available Attendance Forms:                                      |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                 |                               |                   |
| Theoretical lectures in class                                       |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                 |                               |                   |
| 6. Number of Credit Hours (Total) / Number of Units (Total)         |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                 |                               |                   |
| 2/2                                                                 |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                 |                               |                   |
| 7. Course administrator's name (mention all, if more than one name) |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                 |                               |                   |
| Name: Dr. Rasha M. Sami Fadhil Email: Rasha.Fadhil@uomosul.edu.iq   |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                 |                               |                   |
| 8. Course Objectives                                                |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                 |                               |                   |
| Course Objectives                                                   |       | <p><b>On successful completion of this course students will be able to:</b></p> <p>(a) effectively plan, organize, schedule, execute, and lead engineering management-related projects using virtual project teams;(ii)</p> <p>(b) Understand the importance of risk, cost, schedule and resource control and management of a projectlearn, (ii)</p> <p>(c) use project management software; (i)</p> <p>(d) assess team, team member, and project performance (i)</p> |                                                 |                               |                   |
| 9. Teaching and Learning Strategies                                 |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                 |                               |                   |
| Strategy                                                            |       | The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering some challenging problems to motivate students.                                                                                                                              |                                                 |                               |                   |
| 10. Course Structure                                                |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                 |                               |                   |
| Week                                                                | Hours | Required Learning Outcomes                                                                                                                                                                                                                                                                                                                                                                                                                                            | Unit or subject name                            | Learning method               | Evaluation method |
| 1                                                                   | 2     | <p><b>What is a Project. Project Management.</b></p> <p>(i)</p>                                                                                                                                                                                                                                                                                                                                                                                                       | Introduction of engineering management          | Theoretical lectures in class | Exam              |
| 3-2                                                                 | 4     | <p>Contract Parties.,The Resident Engineer.</p> <p><b>Contract Documents.</b></p> <p>Safety and Risk.</p> <p>Construction Project Management System.</p> <p>Project Planning.</p> <p>(i)</p>                                                                                                                                                                                                                                                                          | Defines and important of engineering management | Theoretical lectures in class | Exam              |
| 5-4                                                                 | 4     | <p>Bar chart method (Gantt Chart).</p> <p>Network Analysis Method (Critical Path Method(ii)</p>                                                                                                                                                                                                                                                                                                                                                                       | Techniques for Planning and Scheduling          | Theoretical lectures in class | Exam              |
| 7-6                                                                 | 4     | <p>Activity on arrowAOA</p> <p>Activity on node AON(ii)</p>                                                                                                                                                                                                                                                                                                                                                                                                           | Techniques for Planning and Scheduling          | Theoretical lectures in class | Exam              |
| 8                                                                   | 2     | Monthly Exam                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                 |                               |                   |

|                                                                    |   |                                                         |                                              |                                     |      |
|--------------------------------------------------------------------|---|---------------------------------------------------------|----------------------------------------------|-------------------------------------|------|
| 10-9                                                               | 4 | Resources allocation ,<br>Line of balance( LOB)<br>(ii) | Techniques for<br>Planning and<br>Scheduling | Theoretical<br>lectures in<br>class | Exam |
| 11-12                                                              | 4 | Program Evaluation Review<br>Technique (PERT) (ii)      | Methods of Project<br>Scheduling             | Theoretical<br>lectures in<br>class | Exam |
| 14-13                                                              | 4 | Crashing project (i)<br>And fast -Tracking              | Project management                           | Theoretical<br>lectures in<br>class | Exam |
| 15                                                                 | 2 | Term Exam                                               |                                              |                                     |      |
| 11.Course Evaluation                                               |   |                                                         |                                              |                                     |      |
| Evaluation type                                                    |   |                                                         | Degree                                       |                                     |      |
| 2 homework                                                         |   |                                                         | 20                                           |                                     |      |
| Term exam                                                          |   |                                                         | 20                                           |                                     |      |
| Final exam                                                         |   |                                                         | 60                                           |                                     |      |
| Total                                                              |   |                                                         | 100                                          |                                     |      |
| 12.Learning and Teaching Resources                                 |   |                                                         |                                              |                                     |      |
| Required textbooks (curricular books, if any)                      |   |                                                         | -----                                        |                                     |      |
| Main references (sources)                                          |   |                                                         | Primavera P6 for Project Management          |                                     |      |
| Recommended books and references (scientific journals, reports...) |   |                                                         | -----                                        |                                     |      |
| Electronic References, Websites                                    |   |                                                         | -----                                        |                                     |      |

## Course Description Form

|                                                                     |                                                                                                                                                                                                                                                                                             |
|---------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Course Name:                                                     |                                                                                                                                                                                                                                                                                             |
| Dams Engineering 2                                                  |                                                                                                                                                                                                                                                                                             |
| 2. Course Code:                                                     |                                                                                                                                                                                                                                                                                             |
| DWRE 414                                                            |                                                                                                                                                                                                                                                                                             |
| 3. Semester / Year:                                                 |                                                                                                                                                                                                                                                                                             |
| Spring semester / 2025-2026                                         |                                                                                                                                                                                                                                                                                             |
| 4. Description Preparation Date:                                    |                                                                                                                                                                                                                                                                                             |
| 1/9/2025                                                            |                                                                                                                                                                                                                                                                                             |
| 5. Available Attendance Forms:                                      |                                                                                                                                                                                                                                                                                             |
| Theoretical lectures in class                                       |                                                                                                                                                                                                                                                                                             |
| 6. Number of Credit Hours (Total) / Number of Units (Total)         |                                                                                                                                                                                                                                                                                             |
| 2/4                                                                 |                                                                                                                                                                                                                                                                                             |
| 7. Course administrator's name (mention all, if more than one name) |                                                                                                                                                                                                                                                                                             |
| Name: Dr. Saher Sameer      Email: s.alhilali@uomosul.edu.iq        |                                                                                                                                                                                                                                                                                             |
| Name: Dr. Saher Sameer      Email: aliabdulmawjood@uomosul.edu.iq   |                                                                                                                                                                                                                                                                                             |
| 8. Course Objectives                                                |                                                                                                                                                                                                                                                                                             |
| Course Objectives                                                   | <ul style="list-style-type: none"> <li>Formulate a preliminary design of an earth dam.</li> <li>An ability to specify the problems of seepage through the body of an earth dams.</li> <li>An ability to specify the problems of seepage through the foundation of an earth dams.</li> </ul> |
| 9. Teaching and Learning Strategies                                 |                                                                                                                                                                                                                                                                                             |

|                 |                                                                                                                                                                                                                                                                                                                                                                                                  |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Strategy</b> | The fourth-class students should be awareness about earth and rock fill dams. In addition, to give the students the knowledge about the modes of failure in earth dams, design consideration of an earth dams, seepage control through the body of the dam, and seepage control through the foundation. Component of spillways, types of, and design spillways are explained during this course. |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## 10. Course Structure

| Week | Hours | Required Learning Outcomes                                                            | Unit or subject name        | Learning method              | Evaluation method |
|------|-------|---------------------------------------------------------------------------------------|-----------------------------|------------------------------|-------------------|
| 1    | 2     | Earth and Rock fill Dam                                                               | Earth and Rock fill Dams    | Theoretical lecture in class | Exame             |
| 1    | 2     | Earth and Rock fill Dam (Foundation for earth dam Suit available materials)           | Earth and Rock fill Dams    | Theoretical lecture in class | Exame             |
| 1    | 2     | Earth and Rock fill Dam (Modes of failure in earth dams)                              | Earth and Rock fill Dams    | Theoretical lecture in class | Exame             |
| 1    | 2     | Earth and Rock fill Dam (Location of a phreatic line)                                 | Location of a phreatic line | Theoretical lecture in class | Exame             |
| 1    | 2     | Earth and Rock fill Dams (Design Consideration of an Earth Dams)                      | Design Consideration        | Theoretical lecture in class | HW and Exame      |
| 2    | 4     | Earth and Rock Fill Dam (SEEPAGE CONTROL Seepage Control through the body of the Dam) | SEEPAGE CONTROL             | Theoretical lecture in class | Exame             |
| 2    | 4     | Earth and Rock fill Dam (SEEPAGE CONTROL Seepage Control Through the Foundation)      | SEEPAGE CONTROL             | Theoretical lecture in class | Exame             |
| 1    | 2     | Earth and Rock fill Dam (Stability of Slopes)                                         | Stability of Slopes         | Theoretical lecture in class | HW and Exame      |
| 2    | 4     | Earth and Rock fill Dam ((Swedish) Standard Method of Slices)                         | Stability of Slopes         | Theoretical lecture in class | HW and Exame      |
| 1    | 2     | Spillway (Component of spillways, Types of spillways)                                 | Spillway                    | Theoretical lecture in class | Exame             |

## 11.Course Evaluation

|                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|--------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 quizzes                                                          | 10pts                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 2 homework                                                         | 10pts                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Term Exam                                                          | 20pts                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Final Exam                                                         | 60pts                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Total                                                              | 100pts                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>12.Learning and Teaching Resources</b>                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Required textbooks (curricular books, if any)                      | <p>1. Hydraulics of Dams and Reservoirs, By: Fuat Senturk, Water Resources Publications, Colorado, U.S.A.,1994.</p> <p>2. Theory and Design of Irrigation Structures, Vol. II, By: R. S. Varshney, S. C. Gupta and R. L. Gupta, Nem Chand &amp; Bros, Roorkee (U.P.), India,1982.</p> <p>3. Earth-Rock Dams, Engineering Problems of Design and Construction, By: J. L. Sherard, R. J. Woodward, S. F. Gizienske and W. A. Clevenger, John Wiley and Sons, Inc., New York, 1963.</p> <p>4. Engineering for Dams, By: W. P. Greager, J. D. Justin and J. Hinds, In three Volumes, John Wiley and Sons, Inc., New York, 1961.</p> |
| Recommended books and references (scientific journals, reports...) | <p>Loucks, D. P., Van Beek, E., Stedinger, J. R., Dijkman, J. P., and Villars, M. T. (2005). Water Resources Systems Planning and Management: An Introduction to Methods, Models and Applications. Paris, UNESCO.</p>                                                                                                                                                                                                                                                                                                                                                                                                           |

## Course Description Form

|                                                                            |                                                                                                                                                      |
|----------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>1. Course Name:</b>                                                     |                                                                                                                                                      |
| Foundation Engineering II                                                  |                                                                                                                                                      |
| <b>2. Course Code:</b>                                                     |                                                                                                                                                      |
| DWRE 415                                                                   |                                                                                                                                                      |
| <b>3. Semester / Year:</b>                                                 |                                                                                                                                                      |
| The second course/ 2025 -2026                                              |                                                                                                                                                      |
| <b>4. Description Preparation Date:</b>                                    |                                                                                                                                                      |
| 1/9/2025                                                                   |                                                                                                                                                      |
| <b>5. Available Attendance Forms:</b>                                      |                                                                                                                                                      |
| Class lectures + Electronic lectures                                       |                                                                                                                                                      |
| <b>6. Number of Credit Hours (Total) / Number of Units (Total)</b>         |                                                                                                                                                      |
| 30 hours/ 2 credits                                                        |                                                                                                                                                      |
| <b>7. Course administrator's name (mention all, if more than one name)</b> |                                                                                                                                                      |
| Name: Dr. Laith Khalil Ibrahim                                             | Email: laith.altai@uomosul.edu.iq                                                                                                                    |
| I. M. A. Al-kiki                                                           | Email: i.alkiki@uomosul.edu.iq                                                                                                                       |
| <b>8. Course Objectives</b>                                                |                                                                                                                                                      |
| <b>Course Objectives</b>                                                   | – The optimal, good, economical and safe design of engineering pedestrian foundations (deep foundations) in terms of the student's familiarity with: |

|  |                                                                                                                                                                                                                            |
|--|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <ul style="list-style-type: none"> <li>• Types of piles foundations.</li> <li>• Bearing capacity of piles.</li> <li>• Analysis and distribution of stresses on piles.</li> </ul> <p>- Structural design of foundation.</p> |
|--|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## 9. Teaching and Learning Strategies

|                 |                                                                                                                                                                                                                                                                                                                                          |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Strategy</b> | The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering some challenging problems to motivate students. |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## 10. Course Structure

| Week  | Hours | Required Learning Outcomes                                                                         | Unit or subject name                                           | Learning method  | Evaluation method                |
|-------|-------|----------------------------------------------------------------------------------------------------|----------------------------------------------------------------|------------------|----------------------------------|
| 1     | 2     | Defining the foundations of piles and knowing their types                                          | Introduction and general information                           | Lecture in class | Class discussions                |
| 2 + 3 | 2     | Knowledge of calculating the bearing capacity of the pile in clay soil                             | Bearing capacity of pile in clayey soil                        | Lecture in class | My class and homework assignment |
| 5 + 4 | 4     | Knowledge of calculating the bearing capacity of the pile in sandy soil                            | Bearing capacity of pile in sandy soil                         | Lecture in class | Daily exam                       |
| 6     | 4     | Knowledge of calculating the bearing capacity of pile groups                                       | Bearing capacity of pile groups                                | Lecture in class | My class and homework assignment |
| 7     | 2     | Knowledge of calculating the bearing capacity of piles subjected to negative friction              | Bearing capacity of piles subjected to negative friction       | Lecture in class | Class discussions                |
| 8 + 9 | 4     | Knowledge of calculating the bearing capacity of piles subjected to swell and tension force        | Bearing capacity of piles subjected to swell and tension force | Lecture in class | Class discussions                |
| 10    | 2     | Knowledge of calculating the bearing capacity of piles subjected to swell and tension force moment | Bearing capacity of piles subjected to moment                  | Lecture in class | First course examination No.1    |
| 11    | 2     | Knowledge of structural design for (Single/separate foundations)                                   | The structural design of foundations                           | Lecture in class | My class and homework assignment |
| 12    | 2     | Knowledge of structural design for (raft foundations)                                              | The structural design of foundations                           | Lecture in class | Class discussions                |
| 13    | 2     | Knowledge of structural design for (raft foundations)                                              | The structural design of foundations                           | Lecture in class | Daily exam                       |
| 14    | 2     | Knowledge of structural design for (wall footing and foundations subjected to moment)              | The structural design of foundations                           | Lecture in class | My class and homework assignment |
| 15    | 2     | Knowledge of structural design for (pile caps and reinforcement footing)                           | The structural design of foundations                           | Lecture in class | First course examination No.2    |

## 11.Course Evaluation

|                        |               |
|------------------------|---------------|
| <b>Evaluation type</b> | <b>Degree</b> |
|------------------------|---------------|

|                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|--------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Homework, classwork, reports (6)                                   | 6                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Quizzes (2)                                                        | 8                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Term exam (2)                                                      | 24                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Final exam                                                         | 60                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Total                                                              | 100                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>12.Learning and Teaching Resources</b>                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Required textbooks (curricular books, if any)                      | - الشكرجي ، يوسف والمحمدي، نوري، " هندسة الأسس " ،<br>جامعة بغداد ، الطبعة الاولى، 1985                                                                                                                                                                                                                                                                                                                                                                             |
| Main references (sources)                                          | -Das, B. M., "Principle of Foundation Engineering", Thomson Books/Cole, California State University, Sacramento, 5th ed., 2004.<br>- Peak, R. B., Hanson, W. E. and Thorburn, T.H., " Foundation Engineering ", John Wiley and Sons, 2nd ed., 1974<br>- Bowles, J.E., P.E., S.E." Foundation Analyses and Design ", The McGraw-Hill Companies, Inc, 5th ed., 2006.<br>-Das, B. M., & Sivakugan, N.," Principles of foundation engineering", Cengage learning, 2018. |
| Recommended books and references (scientific journals, reports...) | 18. Al-Rafidain Engineering Journal.<br>19. Highway Research Record , H R R.<br>20. Journal of the Geo technical engineering Division , ASCE.<br>21. Journal of Soil Mechanics and Foundation Division, Proc. ASCE.<br>22. Transportation Research Record , TRR.<br>23. Journal of the Japan Society of Civil Engineering , JSCE.<br>24. The Quarterly Journal of Engineering Geology.                                                                              |
| Electronic References, Websites                                    | None                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

## Course Description Form

|                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Course Name :                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Applied Science                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 2. Course Code:                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| DWRE 417                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 3. Semester / Year:                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Second/ 2025–2026                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 4. Description Preparation Date:                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 1/9/2025                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 5. Available Attendance Forms:                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Theoretical lectures in class                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 6. Number of Credit Hours (Total) / Number of Units (Total)                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 2/2                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 7. Course administrator's name (mention all, if more than one name)                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Name Dr. Saleh Mohammed Saleh      Email: <a href="mailto:s.zakaria@uomosul.edu.iq">s.zakaria@uomosul.edu.iq</a> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 8. Course Objectives                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Course Objectives                                                                                                | <ul style="list-style-type: none"> <li>The aim of this course is to introduce the students to the area of Applied Science. The course will be presented in Arabic. The course will cover the principles of the Applied science focusing on the Fundamentals of each of Hydrochemistry , soil chemistry, Soil Physics, Surface Water Hydrology, as a main four chapters for the course of Applied Science. The course will include mathematical applications and calculations for each of the above chapters. This will enable students, in addition to the course's scientific methodology and hypotheses, to acquire a strong foundation in applied science concepts, providing a supporting background for engineering sciences in dealing with water and soil as both physical and chemical systems. This will be achieved through descriptive lectures and supervised tutorials</li> </ul> |
| 9. Teaching and Learning Strategies                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Strategy                                                                                                         | <ul style="list-style-type: none"> <li>The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises in addition lectures, individual &amp; group assignments, and e-learning platforms, while at the same time refining and expanding their critical thinking skills.</li> <li>Applied science in chemistry, physics and surface water hydrology regarding soil and water resources involves the application of fundamental scientific principles to manage,</li> </ul>                                                                                                                                                                                                                                                                                                                                                           |

conserve, and restore land and water quality for human and environmental needs. This interdisciplinary field combines soil chemistry (nutrient cycling, contaminant fate) and soil physics (water movement, soil structure) to address challenges like sustainable agriculture, pollution, and water scarcity.

- This will be achieved through classes, interactive tutorials and by considering some challenging problems to motivate student

## 10. Course Structure

| Week  | Hours | Required Learning Outcomes                                                                                                                                                                                                                                                                              | Unit or subject name                                                                                                                                                                                                                                                                                                      | Learning method              | Evaluation method |
|-------|-------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|-------------------|
| 1-3   | 6     | Analyze the Molecular Structure of Water, Understand Polarity, Explain Hydrogen Bonding, Demonstrate Ion Stabilization (Hydration), Explain how the polarity of water allows it to act as an effective solvent, Relate Structure to Solubility                                                          | <p>CHAPTER ONE<br/>I- Hydrochemistry</p> <p>A. Fundamentals of Aqueous Chemistry<br/>Introduction</p> <ul style="list-style-type: none"> <li>• polarity,</li> <li>• hydrogen bonding, and</li> <li>• ability to stabilize ions.</li> </ul> <p>B. Hydrogeochemical Processes</p> <p>C. Sources of Chemical Composition</p> | Theoretical lecture in class | HW                |
| 4 - 8 | 10    | Analyze the solid phase, Explain the soil solution, Ion classification: Define CEC, Factors influencing CEC, Understand the solubility of minerals and nutrient availability, Acid–base reactions, Identify reduction-oxidation processes , Explain the principles of cation and anion exchange and how | <p>CHAPTER TWO<br/>- SOIL CHEMISTRY</p> <p>1: Soil Chemical Composition</p> <ul style="list-style-type: none"> <li>• Soil solid phase: minerals, organic matter</li> <li>• Soil solution: dissolved ions</li> </ul>                                                                                                       | Theoretical lecture in class | HW                |

|      |   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                      |                       |
|------|---|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|-----------------------|
|      |   | <p>plants take up nutrients, Understand the impact of soluble salts on soil physical and chemical properties.</p> <p>Interpret Electrical Conductivity and Total Dissolved Solids (TDS). Analyze Soil Salt Content (SSC) and its impact on osmotic potential and plant water uptake, Define Sodicty: Understand the effects of high sodium on soil structure (dispersion), Calculate SAR: Utilize the Sodium Adsorption Ratio to assess potential sodicity hazards. Calculate ESP: Determine the proportion of the CEC occupied by Sodium.</p> | <ul style="list-style-type: none"> <li>• Soil colloids and surface charge</li> <li>• Cations and anions in soil water</li> <li>• Some important Cation and Anion in the soil</li> </ul> <p>2: Cation Exchange Capacity (CEC)</p> <p>3: Soil Chemical Reactions</p> <ul style="list-style-type: none"> <li>• Dissolution and precipitation</li> <li>• Acid–base reactions</li> <li>• Oxidation–reduction</li> <li>• Ion exchange reactions</li> </ul> <p>4: Soil Salinity</p> <ul style="list-style-type: none"> <li>• Soil salinity</li> <li>• Electrical Conductivity (EC)</li> <li>• Total Dissolved Solids (TDS)</li> <li>• Soil Salt Content (SSC)</li> <li>• Salt accumulation mechanisms</li> </ul> <p>5: Sodicty and Sodium Adsorption Ratio (SAR)</p> <p>6: Exchangeable Sodium Percentage (ESP)</p> |                                      |                       |
| 9-12 | 8 | <p>Define soil physics and its role in understanding the solid, liquid, and gaseous phases of the soil</p>                                                                                                                                                                                                                                                                                                                                                                                                                                     | <p>1. Introduction to Soil Physics</p> <p>Scope and importance of soil physics</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <p>Theoretical lectures in class</p> | <p>H W &amp; Exam</p> |

|  |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |
|--|--|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|  |  | <p>system, Describe soil as a three-phase system composed of solids (minerals/organic matter), liquid (water/solutes), and gas (air). Identify and differentiate between soil profile horizons (O, A, B, C, R) and their physical significance. Define soil constituents and explain the significance of particle size distribution (sand, silt, clay) in determining soil behavior. Determine soil texture class, Define soil structure, Distinguish between particle density and bulk density , including calculation methods for both. Calculate total porosity and identify factors affecting it. Differentiate between macro-porosity (drainage/aeration) and micro-porosity (water retention). Explain the concept of soil water potential and its components (matric, gravitational, pressure, osmotic). Define and calculate soil moisture constants, including saturation, field capacity, permanent wilting point, and plant-available water. Interpret the soil water characteristic curve (relationship between matric potential and water content). Describe Darcy's Law and calculate hydraulic conductivity for both saturated and unsaturated flow.</p> | <p>Role in agriculture, ecology, and environmental science</p> <p>2. Soil as a Physical System</p> <p>Soil phases (solid, liquid, gaseous)</p> <p>Soil profile and horizons</p> <p>Soil constituents and particle size distribution</p> <p>3. Soil Texture and Structure</p> <p>Soil texture and textural classes</p> <p>Soil structure: types, formation, and stability</p> <p>Aggregation and pore arrangement</p> <p>4. Soil Density and Porosity</p> <p>Particle density and bulk density</p> <p>Total porosity</p> <p>Macro- and micro-porosity</p> <p>5. Soil Water</p> <p>Forms of soil water</p> <p>Soil water potential and its components</p> <p>Soil moisture constants</p> <p>6. Soil Water Retention &amp; Movement</p> <p>Soil water characteristic curve</p> <p>Infiltration</p> <p>Percolation and drainage</p> <p>Hydraulic conductivity,</p> |  |
|--|--|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|

|       |   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                               |    |
|-------|---|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|----|
| 13-15 | 6 | <p>Thiessen Polygon Method, Isohyetal Method, Apply methods to real-world rainfall data, compare results, and select the appropriate method based on topographic complexity and gauge density. Understand Infiltration Processes: Define infiltration, infiltration capacity, and the factors affecting it (soil type, moisture content, cover). Horton Model (Empirical), Green-Ampt Model (Physically Based), Apply the Green-Ampt equation for calculating cumulative infiltration and infiltration rate, accounting for soil hydraulic conductivity, suction head, and moisture deficit. Application: Compute infiltration losses from a hyetograph using both models to determine excess rainfall for runoff calculations. Understand Runoff Processes: Identify the components of runoff (surface, subsurface, baseflow) and the factors influencing the rainfall-runoff relationship. Rational Method, SCS Curve Number (CN) Method: Calculate volume of direct runoff using the SCS-CN empirical method, determining curve numbers based on land use, hydrologic soil groups, and antecedent moisture conditions</p> | <p>CHAPTER FOUR<br/>IV- Surface Water Hydrology</p> <p>The hydrological cycle</p> <p>1: Precipitation Analysis</p> <p>Precipitation Analysis as an Applied Science</p> <p>Method of estimating average rainfall</p> <p>1- Thiessen polygon method</p> <p>2- Isohyetal method</p> <p>EXAMPLES</p> <p>2: Infiltration</p> <ul style="list-style-type: none"> <li>• Infiltration</li> <li>• Green-Ampt model (physically based) and</li> <li>• Horton model (empirical).</li> </ul> <p>EXAMPLES</p> <p>3: Runoff Estimation</p> <p>How Runoff Estimation Works</p> <p>Runoff Estimation Methods</p> <p>Rational Method</p> <p>Soil Conservation Service (SCS) Curve Number (CN) Method</p> | Theoretical lectures in class | HW |
|-------|---|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|----|

|    |    |                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                       |  |  |
|----|----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|
|    |    | (AMC). Develop a unit hydrograph to estimate the watershed response to a storm event, understand its assumptions (linearity/time invariance), and apply synthetic UH methods (e.g., Snyder or SCS). Application: Compute runoff volumes, peak flows, and timing for specific storm events using all three methods and compare their applicability. | The Unit Hydrograph (UH) method<br><br>EXAMPLES<br><br>4: Watershed Characteristics & Water Balance<br><br>Watershed Characteristics<br><br>Watershed Parameters<br><br>Water Balance |  |  |
| 15 | 30 |                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                       |  |  |

## 11. Course Evaluation

| Evaluation type      | degree |
|----------------------|--------|
| Class Work OR Report | 10     |
| Quiz                 | 10     |
| Monthly Exam         | 20     |
| mid                  | 10     |
| Final Exam           | 50     |
| Total                | 100    |
|                      |        |

## 12. Learning and Teaching Resources

|                                                                                                                                                                                                                                                                                                                   |  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| A. K. Haghi, Devrim Balköse, Omari V. Mukbaniani, Andrew G. Mercader, 2018, APPLIED CHEMISTRY AND CHEMICAL ENGINEERING, Volume 1 , Mathematical and Analytical Techniques, Printed in the United States of America on acid-free paper<br><br>International Standard Book Number-13: 978-1-77188-515-7 (Hardcover) |  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|

|                                                                                                                                                                                                                                                       |  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| International Standard Book Number-13:<br>978-1-315-36562-6 (eBook)                                                                                                                                                                                   |  |
| Pravin Nilkanth Bendle, Rakesh Kumar<br>Yadav, Sujata F Harlapur, Aparna B<br>Dhote, 2023, Published by Rest<br>Publishers Ltd, India. Edition: First<br>Edition, FUNDAMENTALS<br>OF APPLIED CHEMISTRY, Printed in<br>India. ISBN : 978-81-967314-0-3 |  |
| Applied Physics, 11th edition<br>Published by Pearson (October 25, 2024)<br>© 2025<br>Dale Ewen, Neill Schurter, P Erik<br>Gundersen                                                                                                                  |  |
| وارد، روي س.، ومارك روبنسون. مبادئ علم المياه. المجلد ٣٦٧. لندن: ماكجرو<br>هيل، ١٩٧٥.                                                                                                                                                                 |  |
| راغونات، ه. م. (٢٠٠٦). علم المياه: المبادئ والتحليل والتصميم. نيو إيچ<br>إنترناسيونال.                                                                                                                                                                |  |
| <a href="https://books.gw-project.org/groundwater-resource-development/part/references/">https://books.gw-project.org/groundwater-<br/>resource-development/part/references/</a>                                                                      |  |
|                                                                                                                                                                                                                                                       |  |