

# **Course Description Form**

**2005 - 2026**

**University of Mosul**

**College of Environmental Sciences**

**Department of Environmental Technologies**

## Course Description Form

|                                                                     |                                                                                                                                                                                                                                                                                                                                                                                            |
|---------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Course Name:                                                     |                                                                                                                                                                                                                                                                                                                                                                                            |
| Analytical engineering                                              |                                                                                                                                                                                                                                                                                                                                                                                            |
| 2. Course Code:                                                     |                                                                                                                                                                                                                                                                                                                                                                                            |
| EnvTch34                                                            |                                                                                                                                                                                                                                                                                                                                                                                            |
| 3. Semester / Year:                                                 |                                                                                                                                                                                                                                                                                                                                                                                            |
| 2025-2026                                                           |                                                                                                                                                                                                                                                                                                                                                                                            |
| 4. Description Preparation Date:                                    |                                                                                                                                                                                                                                                                                                                                                                                            |
|                                                                     |                                                                                                                                                                                                                                                                                                                                                                                            |
| 5. Available Attendance Forms:                                      |                                                                                                                                                                                                                                                                                                                                                                                            |
|                                                                     |                                                                                                                                                                                                                                                                                                                                                                                            |
| 6. Number of Credit Hours (Total) / Number of Units (Total)         |                                                                                                                                                                                                                                                                                                                                                                                            |
|                                                                     |                                                                                                                                                                                                                                                                                                                                                                                            |
| 7. Course administrator's name (mention all, if more than one name) |                                                                                                                                                                                                                                                                                                                                                                                            |
| Name: Dr. Tahseen Ali                                               |                                                                                                                                                                                                                                                                                                                                                                                            |
| Email: tahssenali1967@uomosul.edu.iq                                |                                                                                                                                                                                                                                                                                                                                                                                            |
| 8. Course Objectives                                                |                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Course Objectives</b>                                            | To provide students with an appropriate amount of information and experience in the field of engineering analysis and methods for solving first- and second-order differential equations. To provide students with an appropriate amount of information and experience in the use and solution of numerical methods and how to extract unknown values from experimentally measured values. |

## 9. Teaching and Learning Strategies

|                 |                                                                                                                                                                                                                                                                                                                                                                         |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Strategy</b> | The main strategy to be adopted in delivering this unit is to encourage students to participate in exercises, while simultaneously improving and expanding their critical thinking skills. This will be achieved through interactive lessons and educational programs, and by considering simple experiments that include sampling activities relevant to the students. |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## 10. Course Structure

| Week | Hours | Required Learning Outcomes | Unit or subject name | Learning method | Evaluation method |
|------|-------|----------------------------|----------------------|-----------------|-------------------|
|      |       |                            |                      |                 |                   |

## 11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily, monthly, or written exams, reports ....etc

## 12. Learning and Teaching Resources

|                                                                    |  |
|--------------------------------------------------------------------|--|
| Required textbooks (curricular books, if any)                      |  |
| Main references (sources)                                          |  |
| Recommended books and references (scientific journals, reports...) |  |
| Electronic References, Websites                                    |  |

## Course Description Form

|                                                                               |                                                                                                                                                                                                                                                                                                                                                                                       |
|-------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Course Name:                                                               |                                                                                                                                                                                                                                                                                                                                                                                       |
| Biochemistry                                                                  |                                                                                                                                                                                                                                                                                                                                                                                       |
| 2. Course Code:                                                               |                                                                                                                                                                                                                                                                                                                                                                                       |
| EnvTch37                                                                      |                                                                                                                                                                                                                                                                                                                                                                                       |
| 3. Semester / Year:                                                           |                                                                                                                                                                                                                                                                                                                                                                                       |
| 2025-2026                                                                     |                                                                                                                                                                                                                                                                                                                                                                                       |
| 4. Description Preparation Date:                                              |                                                                                                                                                                                                                                                                                                                                                                                       |
|                                                                               |                                                                                                                                                                                                                                                                                                                                                                                       |
| 5. Available Attendance Forms:                                                |                                                                                                                                                                                                                                                                                                                                                                                       |
|                                                                               |                                                                                                                                                                                                                                                                                                                                                                                       |
| 6. Number of Credit Hours (Total) / Number of Units (Total)                   |                                                                                                                                                                                                                                                                                                                                                                                       |
|                                                                               |                                                                                                                                                                                                                                                                                                                                                                                       |
| 7. Course administrator's name (mention all, if more than one name)           |                                                                                                                                                                                                                                                                                                                                                                                       |
| Name: Dr. Mayada Ahmed                                                        |                                                                                                                                                                                                                                                                                                                                                                                       |
| Email: <a href="mailto:maysbio55@uomosul.edu.iq">maysbio55@uomosul.edu.iq</a> |                                                                                                                                                                                                                                                                                                                                                                                       |
| 8. Course Objectives                                                          |                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Course Objectives</b>                                                      | <ul style="list-style-type: none"> <li>Biochemistry is concerned with the chemical composition of the components of living cells and understanding the processes of biochemical reactions within them.</li> <li>It studies the chemical nature of different types of nutrients and structural components of the cell and understands their biological functions within it.</li> </ul> |

|  |                                                                                                                                                                                                                                                                      |
|--|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <ul style="list-style-type: none"> <li>• It involves understanding the chemical composition of carbohydrates, proteins, nucleic acids, and lipids, the differences between them, and identifying the functions of each in the cells of a living organism.</li> </ul> |
|--|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## 9. Teaching and Learning Strategies

|                 |                                                                                                                                                                                                                                                                                                                                                                         |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Strategy</b> | The main strategy to be adopted in delivering this unit is to encourage students to participate in exercises, while simultaneously improving and expanding their critical thinking skills. This will be achieved through interactive lessons and educational programs, and by considering simple experiments that include sampling activities relevant to the students. |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## 10. Course Structure

| Week | Hours | Required Learning Outcomes | Unit or subject name | Learning method | Evaluation method |
|------|-------|----------------------------|----------------------|-----------------|-------------------|
|      |       |                            |                      |                 |                   |

## 11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily, monthly, or written exams, reports ....etc

## 12. Learning and Teaching Resources

|                                               |  |
|-----------------------------------------------|--|
| Required textbooks (curricular books, if any) |  |
| Main references (sources)                     |  |

|                                                                       |  |
|-----------------------------------------------------------------------|--|
| Recommended books and references<br>(scientific journals, reports...) |  |
| Electronic References, Websites                                       |  |

# Course Description Form

|                                                                     |                                                                                                                                                                                                                         |
|---------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Course Name:                                                     |                                                                                                                                                                                                                         |
| GIS                                                                 |                                                                                                                                                                                                                         |
| 2. Course Code:                                                     |                                                                                                                                                                                                                         |
| EnvTch33                                                            |                                                                                                                                                                                                                         |
| 3. Semester / Year:                                                 |                                                                                                                                                                                                                         |
| 2025-2026                                                           |                                                                                                                                                                                                                         |
| 4. Description Preparation Date:                                    |                                                                                                                                                                                                                         |
|                                                                     |                                                                                                                                                                                                                         |
| 5. Available Attendance Forms:                                      |                                                                                                                                                                                                                         |
|                                                                     |                                                                                                                                                                                                                         |
| 6. Number of Credit Hours (Total) / Number of Units (Total)         |                                                                                                                                                                                                                         |
|                                                                     |                                                                                                                                                                                                                         |
| 7. Course administrator's name (mention all, if more than one name) |                                                                                                                                                                                                                         |
| Name: Assistant Professor Raad Mahmood Faisal                       |                                                                                                                                                                                                                         |
| Email:                                                              |                                                                                                                                                                                                                         |
| 8. Course Objectives                                                |                                                                                                                                                                                                                         |
| Course Objectives                                                   | <p>Understanding the concept of coordinate systems and map projections.</p> <p>Understanding the fundamental concepts of spatial and descriptive data that form the basis of a Geographic Information System (GIS).</p> |

|  |                                                                                                                                            |
|--|--------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p>Understanding the concepts of linear and raster data models and how to work with them.</p> <p>Producing and designing digital maps.</p> |
|--|--------------------------------------------------------------------------------------------------------------------------------------------|

## 9. Teaching and Learning Strategies

|                 |                                                                                                                                                                                                                                                                                                                                                                                |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Strategy</b> | <p>The main strategy to be adopted in delivering this unit is to encourage students to participate in exercises, while simultaneously improving and expanding their critical thinking skills. This will be achieved through interactive lessons and educational programs, and by considering simple experiments that include sampling activities relevant to the students.</p> |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## 10. Course Structure

| Week | Hours | Required Learning Outcomes | Unit or subject name | Learning method | Evaluation method |
|------|-------|----------------------------|----------------------|-----------------|-------------------|
|      |       |                            |                      |                 |                   |

## 11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily, monthly, or written exams, reports ....etc

## 12. Learning and Teaching Resources

|                                               |  |
|-----------------------------------------------|--|
| Required textbooks (curricular books, if any) |  |
| Main references (sources)                     |  |
| Recommended books and references              |  |

|                                   |  |
|-----------------------------------|--|
| (scientific journals, reports...) |  |
| Electronic References, Websites   |  |

## Course Description Form

|                                                                     |                                                                                                       |
|---------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|
| 1. Course Name:                                                     |                                                                                                       |
| Industrial Wastewater                                               |                                                                                                       |
| 2. Course Code:                                                     |                                                                                                       |
| EnvTch38                                                            |                                                                                                       |
| 3. Semester / Year:                                                 |                                                                                                       |
| 2025-2026                                                           |                                                                                                       |
| 4. Description Preparation Date:                                    |                                                                                                       |
|                                                                     |                                                                                                       |
| 5. Available Attendance Forms:                                      |                                                                                                       |
|                                                                     |                                                                                                       |
| 6. Number of Credit Hours (Total) / Number of Units (Total)         |                                                                                                       |
|                                                                     |                                                                                                       |
| 7. Course administrator's name (mention all, if more than one name) |                                                                                                       |
| Name: Lect. Roao Youns                                              |                                                                                                       |
| Email:                                                              |                                                                                                       |
| 8. Course Objectives                                                |                                                                                                       |
| <b>Course Objectives</b>                                            | Learn how to treat industrial wastewater so that it is in accordance with the required specifications |
| 9. Teaching and Learning Strategies                                 |                                                                                                       |
| <b>Strategy</b>                                                     |                                                                                                       |
| 10. Course Structure                                                |                                                                                                       |

| Week | Hours | Required Learning Outcomes              | Unit or subject name                                                                                                                                                                                                                                                                                                                                          | Learning method | Evaluation method |
|------|-------|-----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|-------------------|
|      |       | That the student understands the lesson | <p>An overview of industrial wastewater</p> <p>Industrial wastewater sources</p> <p>Physical and chemical properties of wastewater</p> <p>Industrial and most important indicators</p> <p>Biological characteristics</p> <p>A field visit</p> <p>Treatment levels:<br/>Pretreatment</p> <p>Primary processing</p> <p>Secondary processing</p> <p>Tertiary</p> |                 |                   |

|                                                                                                                                                                    |  |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  |  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|
|                                                                                                                                                                    |  |  | treatment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |  |  |
| <b>11. Course Evaluation</b>                                                                                                                                       |  |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  |  |
| 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 ....etc |  |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  |  |
| <b>12. Learning and Teaching Resources</b>                                                                                                                         |  |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  |  |
| Required textbooks (curricular books, if any)                                                                                                                      |  |  | Water and Wastewater Treatment and Disposal by Metcalf and Eddy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  |  |
| Main references (sources)                                                                                                                                          |  |  | -                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  |  |
| Recommended books and references (scientific journals, reports...)                                                                                                 |  |  | <p>Metcalf and Eddy, (2003) .Wastewater engineering –treatment and reuse (2003), CHP.13</p> <p>Nemerow, N.L. Industrial Water Pollution; Addison-Wesley: Reading, MA, 1978.</p> <p>Besselièvre, E.B. The Treatment of Industrial Wastes; McGraw-Hill: New York, NY, 1969.</p> <p>Eckenfelder, W.W. Industrial Water Pollution Control; McGraw-Hill: New York, NY, 1989.</p> <p>Orhon D., Babuna, F.G., Karahan, O. Industrial Wastewater Treatment by Activated Sludge, 2009</p> <p>عبد الله صغير، معالجة مياه الصرف الصناعي في الوطن العربي، الدار العربية للعلوم ناشرون، 2017</p> |  |  |
| Electronic References, Websites                                                                                                                                    |  |  | <a href="https://ocw.mit.edu/courses/1-85-water-and-wastewater-treatment-engineering-spring-2006/pages/lecture-notes/">https://ocw.mit.edu/courses/1-85-water-and-wastewater-treatment-engineering-spring-2006/pages/lecture-notes/</a>                                                                                                                                                                                                                                                                                                                                             |  |  |

## Course Description Form

|                                                                     |                                                                                                                                                                                                                                                                                                                                                                                     |
|---------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Course Name:                                                     |                                                                                                                                                                                                                                                                                                                                                                                     |
| Measurement techniques                                              |                                                                                                                                                                                                                                                                                                                                                                                     |
| 2. Course Code:                                                     |                                                                                                                                                                                                                                                                                                                                                                                     |
| EnvTch32                                                            |                                                                                                                                                                                                                                                                                                                                                                                     |
| 3. Semester / Year:                                                 |                                                                                                                                                                                                                                                                                                                                                                                     |
| 2025-2026                                                           |                                                                                                                                                                                                                                                                                                                                                                                     |
| 4. Description Preparation Date:                                    |                                                                                                                                                                                                                                                                                                                                                                                     |
|                                                                     |                                                                                                                                                                                                                                                                                                                                                                                     |
| 5. Available Attendance Forms:                                      |                                                                                                                                                                                                                                                                                                                                                                                     |
|                                                                     |                                                                                                                                                                                                                                                                                                                                                                                     |
| 6. Number of Credit Hours (Total) / Number of Units (Total)         |                                                                                                                                                                                                                                                                                                                                                                                     |
|                                                                     |                                                                                                                                                                                                                                                                                                                                                                                     |
| 7. Course administrator's name (mention all, if more than one name) |                                                                                                                                                                                                                                                                                                                                                                                     |
| Name:                                                               |                                                                                                                                                                                                                                                                                                                                                                                     |
| Email:                                                              |                                                                                                                                                                                                                                                                                                                                                                                     |
| 8. Course Objectives                                                |                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Course Objectives</b>                                            | <ul style="list-style-type: none"> <li>Students will learn how to use laboratory equipment and techniques.</li> <li>They will learn about the measuring instruments used in practical scientific research.</li> <li>They will learn how to calculate measurement errors, analyze the results of practical measurements, and discuss them scientifically and objectively.</li> </ul> |

## 9. Teaching and Learning Strategies

|                 |                                                                                                                                                                                                                                                                                                                                                                         |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Strategy</b> | The main strategy to be adopted in delivering this unit is to encourage students to participate in exercises, while simultaneously improving and expanding their critical thinking skills. This will be achieved through interactive lessons and educational programs, and by considering simple experiments that include sampling activities relevant to the students. |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## 10. Course Structure

| Week | Hours | Required Learning Outcomes | Unit or subject name | Learning method | Evaluation method |
|------|-------|----------------------------|----------------------|-----------------|-------------------|
|      |       |                            |                      |                 |                   |

## 11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily, monthly, or written exams, reports ....etc

## 12. Learning and Teaching Resources

|                                                                    |  |
|--------------------------------------------------------------------|--|
| Required textbooks (curricular books, if any)                      |  |
| Main references (sources)                                          |  |
| Recommended books and references (scientific journals, reports...) |  |
| Electronic References, Websites                                    |  |

## Course Description Form

|                                                                     |                                                                                                                                                                                                                                                                                                                                                                           |
|---------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Course Name:                                                     |                                                                                                                                                                                                                                                                                                                                                                           |
| Soil Pollution                                                      |                                                                                                                                                                                                                                                                                                                                                                           |
| 2. Course Code:                                                     |                                                                                                                                                                                                                                                                                                                                                                           |
| EnvTch36                                                            |                                                                                                                                                                                                                                                                                                                                                                           |
| 3. Semester / Year:                                                 |                                                                                                                                                                                                                                                                                                                                                                           |
| 2025-2026                                                           |                                                                                                                                                                                                                                                                                                                                                                           |
| 4. Description Preparation Date:                                    |                                                                                                                                                                                                                                                                                                                                                                           |
|                                                                     |                                                                                                                                                                                                                                                                                                                                                                           |
| 5. Available Attendance Forms:                                      |                                                                                                                                                                                                                                                                                                                                                                           |
|                                                                     |                                                                                                                                                                                                                                                                                                                                                                           |
| 6. Number of Credit Hours (Total) / Number of Units (Total)         |                                                                                                                                                                                                                                                                                                                                                                           |
|                                                                     |                                                                                                                                                                                                                                                                                                                                                                           |
| 7. Course administrator's name (mention all, if more than one name) |                                                                                                                                                                                                                                                                                                                                                                           |
| Name: Dr. Abdulsattar Jubair                                        |                                                                                                                                                                                                                                                                                                                                                                           |
| Email:                                                              |                                                                                                                                                                                                                                                                                                                                                                           |
| 8. Course Objectives                                                |                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Course Objectives</b>                                            | Identifying soil pollutants and some chemical properties and methods for estimating them after taking samples and making extracts, estimating cations and anions in the soil, how to analyze and classify the results, dealing with the soil laboratory, preparing samples for examination, and knowing the approved recommendations to reduce the environmental impact.. |

## 9. Teaching and Learning Strategies

|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Strategy</b> | The main strategy that will be adopted in presenting this course is for the student to know the pollutants that occur in the soil, their source, their effect on the soil, and the extent to which they can be identified through the use of soil laboratories, conducting chemical tests for them, presenting the practical results and comparing them with the approved classifications and their impact on the soil and the environmental aspect. |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## 10. Course Structure

| Week | Hours | Required Learning Outcomes              | Unit or subject name                                                                                                                                                         | Learning method | Evaluation method |
|------|-------|-----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|-------------------|
|      |       | That the student understands the lesson | Soil pollution definition, introduction to environmental quality, sources and nature of soil pollution and its harmful effects<br><br>Soil salinity sources of soil salinity |                 |                   |

## 11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as

daily preparation, dailyoral, monthly, or written exams, reports ....etc

## 12. Learning and Teaching Resources

|                                                                       |                                                                                                                                       |
|-----------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|
| Required textbooks (curricular books, if any)                         | Soil Pollution. Origin, Monitoring & Remediation.2008.<br>Ibrahim A. Mirsal                                                           |
| Main references (sources)                                             | Soil Pollution: From Monitoring to Remediation 1st Edition.2017.<br>Armando C. Duarte, Anabela Cachada, Teresa A.P. Rocha-Santos      |
| Recommended books and references<br>(scientific journals, reports...) | -                                                                                                                                     |
| Electronic References, Websites                                       | <a href="https://www.alibris.com/search/books/subject/Soil-pollution">https://www.alibris.com/search/books/subject/Soil-pollution</a> |

## Course Description Form

|                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|---------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Course Name:                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Thermodynamics                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 2. Course Code:                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| EnvTch39                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 3. Semester / Year:                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 2025-2026                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 4. Description Preparation Date:                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 5. Available Attendance Forms:                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 6. Number of Credit Hours (Total) / Number of Units (Total)         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 7. Course administrator's name (mention all, if more than one name) |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Name: Dr. Eman Al-Jajawady                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Email:                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 8. Course Objectives                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Course Objectives</b>                                            | <p><b>Thermodynamics :</b>The objective of this course is to learn about</p> <ul style="list-style-type: none"> <li>Concept temperature; the heat</li> <li>basic theories in deriving the general law of gases,</li> <li>Thermodynamic system (closed, open, or controlled the sound);</li> <li>Thermodynamic and equilibrium properties.</li> </ul> <p>System Status, Status Diagram, Path and process different working methods of the zero ,first ,second ,three law of thermodynamics; familiarity with the three public sector in</p> |

|  |                |
|--|----------------|
|  | Thermodynamics |
|--|----------------|

## 9. Teaching and Learning Strategies

|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Strategy</b> | <ol style="list-style-type: none"> <li>1. Define terminology and become familiar with units concerned with basic concepts of the thermodynamics and Explain basic thermodynamic properties and units..</li> <li>2. .Define the meaning of the state of a working substance</li> <li>3. Derive ,discuss and apply the first law and second of thermodynamics</li> <li>4. Understand concepts of heat, work, and energy.</li> </ol> |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## 10. Course Structure

| Week | Hours | Required Learning Outcomes              | Unit or subject name                                                                                                                                                                                                                                       | Learning method | Evaluation method |
|------|-------|-----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|-------------------|
|      |       | That the student understands the lesson | <p>Introduction - Prescribed Books - Units.</p> <p>Important definitions - force - pressure and its types Temperature: its units,</p> <p>its conversions, and its measurement methods</p> <p>equilibrium, properties of p matter, and P diagram, Ideal</p> |                 |                   |

|                                                                                                                                                                    |  |  |                                                                                                                                                                                                                                                                                                                                                                                                         |  |  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|
|                                                                                                                                                                    |  |  | Boyle's Law<br>Charles's Law<br>equation of state                                                                                                                                                                                                                                                                                                                                                       |  |  |
| <b>11. Course Evaluation</b>                                                                                                                                       |  |  |                                                                                                                                                                                                                                                                                                                                                                                                         |  |  |
| 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 ....etc |  |  |                                                                                                                                                                                                                                                                                                                                                                                                         |  |  |
| <b>12. Learning and Teaching Resources</b>                                                                                                                         |  |  |                                                                                                                                                                                                                                                                                                                                                                                                         |  |  |
| Required textbooks (curricular books, if any)                                                                                                                      |  |  | <p>- Peter Atkins, The Laws of Thermodynamics: A Very Short Introduction, Oxford, ISBN-10 9780199572199</p> <p>- Atkins, Peter, de Paula, Julio, Keeler, James, Physical Chemistry, Published by Oxford University Press, 2018</p> <p>ISBN:10: 0198817894 / ISBN 13: 9780198817895</p>                                                                                                                  |  |  |
| Main references (sources)                                                                                                                                          |  |  |                                                                                                                                                                                                                                                                                                                                                                                                         |  |  |
| Recommended books and references (scientific journals, reports...)                                                                                                 |  |  | <p>- Fundamentals of heat and mass transfer, by f.p. Incropera &amp; d.p. De witt, John Wiley &amp; Sons; 5th edition (2002)</p> <p>- Applications of thermodynamics" by: wood; addison-wesley</p> <p>- Basic thermodynamics: elements of energy systems" by: skrotzki; mcgraw-hill, copy 2018</p> <p>- Introduction to Modern Thermodynamics, by Dilip Kondepudi, John Wiley &amp; Sons Inc., 2008</p> |  |  |
| Electronic References, Websites                                                                                                                                    |  |  |                                                                                                                                                                                                                                                                                                                                                                                                         |  |  |

## Course Description Form

|                                                                     |                                                                                                                                                                                         |
|---------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Course Name:                                                     |                                                                                                                                                                                         |
| Treatment of Solid Waste                                            |                                                                                                                                                                                         |
| 2. Course Code:                                                     |                                                                                                                                                                                         |
| EnvTch35                                                            |                                                                                                                                                                                         |
| 3. Semester / Year:                                                 |                                                                                                                                                                                         |
| 2025-2026                                                           |                                                                                                                                                                                         |
| 4. Description Preparation Date:                                    |                                                                                                                                                                                         |
|                                                                     |                                                                                                                                                                                         |
| 5. Available Attendance Forms:                                      |                                                                                                                                                                                         |
|                                                                     |                                                                                                                                                                                         |
| 6. Number of Credit Hours (Total) / Number of Units (Total)         |                                                                                                                                                                                         |
|                                                                     |                                                                                                                                                                                         |
| 7. Course administrator's name (mention all, if more than one name) |                                                                                                                                                                                         |
| Name: Assist. Lect. Omar Khair Aldin                                |                                                                                                                                                                                         |
| Email:                                                              |                                                                                                                                                                                         |
| 8. Course Objectives                                                |                                                                                                                                                                                         |
| <b>Course Objectives</b>                                            | The course aims to introduce the student to waste, its types, its harm the environment, and how to collect and dispose of it through sanitary landfilling or recycling important waste. |
| 9. Teaching and Learning Strategies                                 |                                                                                                                                                                                         |

|                 |                                                                                                                                                                         |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Strategy</b> | The course is annual and is four hours a week. It is a theoretical subject and students are tested in the form of daily and monthly examinations and in a written form. |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

#### 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> |
|-------------|--------------|-----------------------------------------|-----------------------------|------------------------|--------------------------|
|             |              | That the student understands the lesson |                             |                        |                          |

#### 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 ....etc

#### 12. Learning and Teaching Resources

|                                                                    |                                                                                                                                                                                             |
|--------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Required textbooks (curricular books, if any)                      | <b>Introduction to environmental engineering and science / Gelbert M. Masters</b><br><b>Solid wastes Engineering Principles and Management Issues/ George Tchobanglous , Hilary Theisen</b> |
| Main references (sources)                                          |                                                                                                                                                                                             |
| Recommended books and references (scientific journals, reports...) |                                                                                                                                                                                             |
| Electronic References, Websites                                    |                                                                                                                                                                                             |



## Course Description Form

|                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                    |
|---------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Course Name:                                                           |                                                                                                                                                                                                                                                                                                                                                                                                    |
| Water supply                                                              |                                                                                                                                                                                                                                                                                                                                                                                                    |
| 2. Course Code:                                                           |                                                                                                                                                                                                                                                                                                                                                                                                    |
| EnvTch31                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                    |
| 3. Semester / Year:                                                       |                                                                                                                                                                                                                                                                                                                                                                                                    |
| 2025-2026                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                    |
| 4. Description Preparation Date:                                          |                                                                                                                                                                                                                                                                                                                                                                                                    |
|                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                    |
| 5. Available Attendance Forms:                                            |                                                                                                                                                                                                                                                                                                                                                                                                    |
|                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                    |
| 6. Number of Credit Hours (Total) / Number of Units (Total)               |                                                                                                                                                                                                                                                                                                                                                                                                    |
|                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                    |
| 7. Course administrator's name (mention all, if more than one name)       |                                                                                                                                                                                                                                                                                                                                                                                                    |
| Name: Assistant Professor Mohammed Fakhr aldin                            |                                                                                                                                                                                                                                                                                                                                                                                                    |
| Email: <a href="mailto:milhebi@uomosul.edu.iq">milhebi@uomosul.edu.iq</a> |                                                                                                                                                                                                                                                                                                                                                                                                    |
| 8. Course Objectives                                                      |                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Course Objectives</b>                                                  | <ol style="list-style-type: none"> <li>1. The student will gain a skill in understanding the terminology of water treatment plants.</li> <li>2. The student will acquire knowledge of water treatment plant unit design.</li> <li>3. This semester covers the fundamental concepts of how to treat raw water and make it potable.</li> <li>4. The student will gain skills in how water</li> </ol> |

|  |                                                                                                                                                                              |
|--|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p>treatment plants work and operate.</p> <p>5. The student will understand the types of water treatment: physical, chemical, and biological, through practical lessons.</p> |
|--|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## 9. Teaching and Learning Strategies

|                 |                                                                                                                                                                                                                                                                                                                                                                                |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Strategy</b> | <p>The main strategy to be adopted in delivering this unit is to encourage students to participate in exercises, while simultaneously improving and expanding their critical thinking skills. This will be achieved through interactive lessons and educational programs, and by considering simple experiments that include sampling activities relevant to the students.</p> |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## 10. Course Structure

| Week | Hours | Required Learning Outcomes | Unit or subject name | Learning method | Evaluation method |
|------|-------|----------------------------|----------------------|-----------------|-------------------|
|      |       |                            |                      |                 |                   |

## 11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily, monthly, or written exams, reports ....etc

## 12. Learning and Teaching Resources

|                                                                    |  |
|--------------------------------------------------------------------|--|
| Required textbooks (curricular books, if any)                      |  |
| Main references (sources)                                          |  |
| Recommended books and references (scientific journals, reports...) |  |

|                                 |  |
|---------------------------------|--|
| Electronic References, Websites |  |
|---------------------------------|--|

## Course Description Form

|                                                                           |                                                                                                                                                                                                                                                           |
|---------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Course Name:                                                           |                                                                                                                                                                                                                                                           |
| Air Pollution                                                             |                                                                                                                                                                                                                                                           |
| 2. Course Code:                                                           |                                                                                                                                                                                                                                                           |
| EnvTch44                                                                  |                                                                                                                                                                                                                                                           |
| 3. Semester / Year:                                                       |                                                                                                                                                                                                                                                           |
| 2025-2026                                                                 |                                                                                                                                                                                                                                                           |
| 4. Description Preparation Date:                                          |                                                                                                                                                                                                                                                           |
|                                                                           |                                                                                                                                                                                                                                                           |
| 5. Available Attendance Forms:                                            |                                                                                                                                                                                                                                                           |
|                                                                           |                                                                                                                                                                                                                                                           |
| 6. Number of Credit Hours (Total) / Number of Units (Total)               |                                                                                                                                                                                                                                                           |
|                                                                           |                                                                                                                                                                                                                                                           |
| 7. Course administrator's name (mention all, if more than one name)       |                                                                                                                                                                                                                                                           |
| Name: Assistant Professor Mohammed Fakhri AlDin                           |                                                                                                                                                                                                                                                           |
| Email: <a href="mailto:milhebi@uomosul.edu.iq">milhebi@uomosul.edu.iq</a> |                                                                                                                                                                                                                                                           |
| 8. Course Objectives                                                      |                                                                                                                                                                                                                                                           |
| <b>Course Objectives</b>                                                  | <p>1. This course aims to identify prevalent air pollutants, their harmful effects, and methods for mitigating them.</p> <p>2. This course aims to identify indoor air pollutants and their treatment.</p> <p>3. This course aims to identify gaseous</p> |

|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|--|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p>pollutants emitted by vehicles and methods for reducing them.</p> <p>4. This course aims to identify greenhouse gases, their role in global warming, the resulting harm, and methods for mitigating the effects of climate change.</p> <p>5. This course aims to identify the concentrations of pollutants emitted at point, line, and area levels.</p> <p>6. This course aims to teach how to sample chimneys and calculate the concentration and types of emitted air pollutants.</p> |
|--|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## 9. Teaching and Learning Strategies

|                 |                                                                                                                                                                                                                                                                                                                                                                                |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Strategy</b> | <p>The main strategy to be adopted in delivering this unit is to encourage students to participate in exercises, while simultaneously improving and expanding their critical thinking skills. This will be achieved through interactive lessons and educational programs, and by considering simple experiments that include sampling activities relevant to the students.</p> |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## 10. Course Structure

| Week | Hours | Required Learning Outcomes | Unit or subject name | Learning method | Evaluation method |
|------|-------|----------------------------|----------------------|-----------------|-------------------|
|------|-------|----------------------------|----------------------|-----------------|-------------------|

|                                                                                                                                                               |  |  |  |  |  |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|--|
|                                                                                                                                                               |  |  |  |  |  |
| <b>11. Course Evaluation</b>                                                                                                                                  |  |  |  |  |  |
| Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily, monthly, or written exams, reports ....etc |  |  |  |  |  |
| <b>12. Learning and Teaching Resources</b>                                                                                                                    |  |  |  |  |  |
| Required textbooks (curricular books, if any)                                                                                                                 |  |  |  |  |  |
| Main references (sources)                                                                                                                                     |  |  |  |  |  |
| Recommended books and references<br>(scientific journals, reports...)                                                                                         |  |  |  |  |  |
| Electronic References, Websites                                                                                                                               |  |  |  |  |  |

## Course Description Form

|                                                                               |                                                                                                                                                                                                                                                                                                                          |
|-------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Course Name:                                                               |                                                                                                                                                                                                                                                                                                                          |
| Environmental Costs                                                           |                                                                                                                                                                                                                                                                                                                          |
| 2. Course Code:                                                               |                                                                                                                                                                                                                                                                                                                          |
| EnvTch48                                                                      |                                                                                                                                                                                                                                                                                                                          |
| 3. Semester / Year:                                                           |                                                                                                                                                                                                                                                                                                                          |
| 2025-2026                                                                     |                                                                                                                                                                                                                                                                                                                          |
| 4. Description Preparation Date:                                              |                                                                                                                                                                                                                                                                                                                          |
|                                                                               |                                                                                                                                                                                                                                                                                                                          |
| 5. Available Attendance Forms:                                                |                                                                                                                                                                                                                                                                                                                          |
|                                                                               |                                                                                                                                                                                                                                                                                                                          |
| 6. Number of Credit Hours (Total) / Number of Units (Total)                   |                                                                                                                                                                                                                                                                                                                          |
|                                                                               |                                                                                                                                                                                                                                                                                                                          |
| 7. Course administrator's name (mention all, if more than one name)           |                                                                                                                                                                                                                                                                                                                          |
| Name: Dr. Hassan Hassan                                                       |                                                                                                                                                                                                                                                                                                                          |
| Email: <a href="mailto:dr.hassan@uomosul.edu.iq">dr.hassan@uomosul.edu.iq</a> |                                                                                                                                                                                                                                                                                                                          |
| 8. Course Objectives                                                          |                                                                                                                                                                                                                                                                                                                          |
| <b>Course Objectives</b>                                                      | <ul style="list-style-type: none"> <li>Transforming the state's economic capital into sustainable capital...</li> <li>Writing environmental reports and solutions for addressing environmental pollution at the lowest possible cost...</li> <li>Activating the social responsibility of industrial companies</li> </ul> |

## 9. Teaching and Learning Strategies

### Strategy

The main strategy to be adopted in delivering this unit is to encourage students to participate in exercises, while simultaneously improving and expanding their critical thinking skills. This will be achieved through interactive lessons and educational programs, and by considering simple experiments that include sampling activities relevant to the students.

## 10. Course Structure

| Week | Hours | Required Learning Outcomes | Unit or subject name | Learning method | Evaluation method |
|------|-------|----------------------------|----------------------|-----------------|-------------------|
|      |       |                            |                      |                 |                   |

## 11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily, monthly, or written exams, reports ....etc

## 12. Learning and Teaching Resources

|                                                                    |  |
|--------------------------------------------------------------------|--|
| Required textbooks (curricular books, if any)                      |  |
| Main references (sources)                                          |  |
| Recommended books and references (scientific journals, reports...) |  |
| Electronic References, Websites                                    |  |

## Course Description Form

|                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|---------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Course Name:                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Irrigation and drainage                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 2. Course Code:                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| EnvTch43                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 3. Semester / Year:                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 2025-2026                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 4. Description Preparation Date:                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 5. Available Attendance Forms:                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 6. Number of Credit Hours (Total) / Number of Units (Total)         |                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 7. Course administrator's name (mention all, if more than one name) |                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Name: Dr. Mohammed Ali                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Email:                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 8. Course Objectives                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Course Objectives</b>                                            | This course introduces students to the fundamentals of irrigation and drainage science, soil physical properties, irrigation water quality and its suitability for various uses, as well as studying traditional and modern irrigation techniques, calculating water requirements, managing water budgets, and the standards used to increase irrigation efficiency. It also explains the importance of drainage, its types, and |

|                                                                                                                                                               |       |                                                                                                                                                                                                                                                                                                                                                                         |                           |                 |                   |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|-----------------|-------------------|
|                                                                                                                                                               |       |                                                                                                                                                                                                                                                                                                                                                                         | land reclamation methods. |                 |                   |
| 9. Teaching and Learning Strategies                                                                                                                           |       |                                                                                                                                                                                                                                                                                                                                                                         |                           |                 |                   |
| Strategy                                                                                                                                                      |       | The main strategy to be adopted in delivering this unit is to encourage students to participate in exercises, while simultaneously improving and expanding their critical thinking skills. This will be achieved through interactive lessons and educational programs, and by considering simple experiments that include sampling activities relevant to the students. |                           |                 |                   |
| 10. Course Structure                                                                                                                                          |       |                                                                                                                                                                                                                                                                                                                                                                         |                           |                 |                   |
| Week                                                                                                                                                          | Hours | Required Learning Outcomes                                                                                                                                                                                                                                                                                                                                              | Unit or subject name      | Learning method | Evaluation method |
|                                                                                                                                                               |       |                                                                                                                                                                                                                                                                                                                                                                         |                           |                 |                   |
| 11. Course Evaluation                                                                                                                                         |       |                                                                                                                                                                                                                                                                                                                                                                         |                           |                 |                   |
| Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily, monthly, or written exams, reports ....etc |       |                                                                                                                                                                                                                                                                                                                                                                         |                           |                 |                   |
| 12. Learning and Teaching Resources                                                                                                                           |       |                                                                                                                                                                                                                                                                                                                                                                         |                           |                 |                   |
| Required textbooks (curricular books, if any)                                                                                                                 |       |                                                                                                                                                                                                                                                                                                                                                                         |                           |                 |                   |

|                                                                       |                                                                        |
|-----------------------------------------------------------------------|------------------------------------------------------------------------|
| Main references (sources)                                             |                                                                        |
| Recommended books and references<br>(scientific journals, reports...) | secruoseR retaW dna noitagirrl<br>awasA .L .G yb kcabrepaP gnireenignE |
| Electronic References, Websites                                       |                                                                        |

## Course Description Form

|                                                                     |                                                                                                                                                                                                                                                                                                    |
|---------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Course Name:                                                     |                                                                                                                                                                                                                                                                                                    |
| Remote sensing                                                      |                                                                                                                                                                                                                                                                                                    |
| 2. Course Code:                                                     |                                                                                                                                                                                                                                                                                                    |
| EnvTch46                                                            |                                                                                                                                                                                                                                                                                                    |
| 3. Semester / Year:                                                 |                                                                                                                                                                                                                                                                                                    |
| 2025-2026                                                           |                                                                                                                                                                                                                                                                                                    |
| 4. Description Preparation Date:                                    |                                                                                                                                                                                                                                                                                                    |
|                                                                     |                                                                                                                                                                                                                                                                                                    |
| 5. Available Attendance Forms:                                      |                                                                                                                                                                                                                                                                                                    |
|                                                                     |                                                                                                                                                                                                                                                                                                    |
| 6. Number of Credit Hours (Total) / Number of Units (Total)         |                                                                                                                                                                                                                                                                                                    |
|                                                                     |                                                                                                                                                                                                                                                                                                    |
| 7. Course administrator's name (mention all, if more than one name) |                                                                                                                                                                                                                                                                                                    |
| Name: Assistant Professor Dr. Abdulrahman Ramzi                     |                                                                                                                                                                                                                                                                                                    |
| Email: abdqubaa@uomosul.edu.iq                                      |                                                                                                                                                                                                                                                                                                    |
| 8. Course Objectives                                                |                                                                                                                                                                                                                                                                                                    |
| <b>Course Objectives</b>                                            | <ul style="list-style-type: none"> <li>To provide an overview of the physical principles of remote sensing.</li> <li>To introduce students to remote sensing data processing for analysis and interpretation, and to develop applications for Earth resource management and monitoring.</li> </ul> |

|  |                                                                                                                                                                                                                                                                     |
|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <ul style="list-style-type: none"> <li>• To develop specific skills in using spatial analysis and remote sensing software used in geographic research.</li> <li>• To explore how these concepts can be applied to a range of environmental applications.</li> </ul> |
|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## 9. Teaching and Learning Strategies

|                 |                                                                                                                                                                                                                                                                                                                                                                         |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Strategy</b> | The main strategy to be adopted in delivering this unit is to encourage students to participate in exercises, while simultaneously improving and expanding their critical thinking skills. This will be achieved through interactive lessons and educational programs, and by considering simple experiments that include sampling activities relevant to the students. |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## 10. Course Structure

| Week | Hours | Required Learning Outcomes | Unit or subject name | Learning method | Evaluation method |
|------|-------|----------------------------|----------------------|-----------------|-------------------|
|      |       |                            |                      |                 |                   |

## 11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily, monthly, or written exams, reports ....etc

## 12. Learning and Teaching Resources

|                                               |  |
|-----------------------------------------------|--|
| Required textbooks (curricular books, if any) |  |
|-----------------------------------------------|--|

|                                                                       |                                                                                                                                                                                                      |
|-----------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Main references (sources)                                             | <b>BOOK: Remote sensing and image interpretation</b><br><br><b>Lillesand, Thomas M.; Kiefer, Ralph W.; Chipman, Jonathan W. 6th ed Chichester John Wiley [distributor] c2008</b>                     |
| Recommended books and references<br>(scientific journals, reports...) | <b>BOOK: Introduction to the physics and techniques of remote sensing</b><br><br><b>Elachi, Charles; Van Zyl, Jakob 2nd ed Hoboken, N.J. Wiley-Interscience Wiley series in remote sensing c2006</b> |
| Electronic References, Websites                                       |                                                                                                                                                                                                      |

## Course Description Form

|                                                                     |                                                                                                                                                                                                                                                               |
|---------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Course Name:                                                     |                                                                                                                                                                                                                                                               |
| Renewable energy                                                    |                                                                                                                                                                                                                                                               |
| 2. Course Code:                                                     |                                                                                                                                                                                                                                                               |
| EnvTch49                                                            |                                                                                                                                                                                                                                                               |
| 3. Semester / Year:                                                 |                                                                                                                                                                                                                                                               |
| 2025-2026                                                           |                                                                                                                                                                                                                                                               |
| 4. Description Preparation Date:                                    |                                                                                                                                                                                                                                                               |
|                                                                     |                                                                                                                                                                                                                                                               |
| 5. Available Attendance Forms:                                      |                                                                                                                                                                                                                                                               |
|                                                                     |                                                                                                                                                                                                                                                               |
| 6. Number of Credit Hours (Total) / Number of Units (Total)         |                                                                                                                                                                                                                                                               |
|                                                                     |                                                                                                                                                                                                                                                               |
| 7. Course administrator's name (mention all, if more than one name) |                                                                                                                                                                                                                                                               |
| Name: Assistant lecturer Yaser Hazim                                |                                                                                                                                                                                                                                                               |
| Email: yasir.younis@uomosul.edu.iq                                  |                                                                                                                                                                                                                                                               |
| 8. Course Objectives                                                |                                                                                                                                                                                                                                                               |
| <b>Course Objectives</b>                                            | <ul style="list-style-type: none"> <li>Understanding the concept of renewable energy.</li> <li>Understanding the general framework of renewable energy.</li> <li>Understanding the differences between renewable and non-renewable energy sources.</li> </ul> |

|  |                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|--|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <ul style="list-style-type: none"> <li>• Understanding the advantages of using renewable energy.</li> <li>• Understanding the differences between the types of technologies used to utilize renewable energy sources.</li> <li>• Identifying the uses of renewable energy sources (agriculture, industry, transportation, etc.).</li> <li>• Developing innovative technologies for utilizing renewable energy sources.</li> </ul> |
|--|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## 9. Teaching and Learning Strategies

|                 |                                                                                                                                                                                                                                                                                                                                                                         |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Strategy</b> | The main strategy to be adopted in delivering this unit is to encourage students to participate in exercises, while simultaneously improving and expanding their critical thinking skills. This will be achieved through interactive lessons and educational programs, and by considering simple experiments that include sampling activities relevant to the students. |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## 10. Course Structure

| Week | Hours | Required Learning Outcomes | Unit or subject name | Learning method | Evaluation method |
|------|-------|----------------------------|----------------------|-----------------|-------------------|
|      |       |                            |                      |                 |                   |

## 11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily, monthly, or written exams, reports ....etc

## 12. Learning and Teaching Resources

Required textbooks (curricular books, if any)

Main references (sources)

Recommended books and references  
(scientific journals, reports...)

John Twidell الطبعة الثالثة Renewable energy  
resources

Electronic References, Websites

## Course Description Form

|                                                                     |                                                                                                                                                                                                                                                                                               |
|---------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Course Name:                                                     |                                                                                                                                                                                                                                                                                               |
| Urban planning                                                      |                                                                                                                                                                                                                                                                                               |
| 2. Course Code:                                                     |                                                                                                                                                                                                                                                                                               |
| EnvTch45                                                            |                                                                                                                                                                                                                                                                                               |
| 3. Semester / Year:                                                 |                                                                                                                                                                                                                                                                                               |
| 2025-2026                                                           |                                                                                                                                                                                                                                                                                               |
| 4. Description Preparation Date:                                    |                                                                                                                                                                                                                                                                                               |
|                                                                     |                                                                                                                                                                                                                                                                                               |
| 5. Available Attendance Forms:                                      |                                                                                                                                                                                                                                                                                               |
|                                                                     |                                                                                                                                                                                                                                                                                               |
| 6. Number of Credit Hours (Total) / Number of Units (Total)         |                                                                                                                                                                                                                                                                                               |
|                                                                     |                                                                                                                                                                                                                                                                                               |
| 7. Course administrator's name (mention all, if more than one name) |                                                                                                                                                                                                                                                                                               |
| Name: Dr. Hassan Hassan                                             |                                                                                                                                                                                                                                                                                               |
| Email:                                                              |                                                                                                                                                                                                                                                                                               |
| 8. Course Objectives                                                |                                                                                                                                                                                                                                                                                               |
| <b>Course Objectives</b>                                            | <ul style="list-style-type: none"> <li>To provide students with the appropriate amount of information and experience in the field of urban planning</li> <li>In a way that contributes to their acquisition of practical experience and academic preparation for professional life</li> </ul> |

|  |                                                                                                                                            |
|--|--------------------------------------------------------------------------------------------------------------------------------------------|
|  | <ul style="list-style-type: none"> <li>• And helps them become familiar with the basic principles of urban planning approaches.</li> </ul> |
|--|--------------------------------------------------------------------------------------------------------------------------------------------|

## 9. Teaching and Learning Strategies

|                 |                                                                                                                                                                                                                                                                                                                                                                         |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Strategy</b> | The main strategy to be adopted in delivering this unit is to encourage students to participate in exercises, while simultaneously improving and expanding their critical thinking skills. This will be achieved through interactive lessons and educational programs, and by considering simple experiments that include sampling activities relevant to the students. |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## 10. Course Structure

| Week | Hours | Required Learning Outcomes | Unit or subject name | Learning method | Evaluation method |
|------|-------|----------------------------|----------------------|-----------------|-------------------|
|      |       |                            |                      |                 |                   |

## 11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily, monthly, or written exams, reports ....etc

## 12. Learning and Teaching Resources

|                                                                    |  |
|--------------------------------------------------------------------|--|
| Required textbooks (curricular books, if any)                      |  |
| Main references (sources)                                          |  |
| Recommended books and references (scientific journals, reports...) |  |

|                                 |  |
|---------------------------------|--|
| Electronic References, Websites |  |
|---------------------------------|--|

## Course Description Form

|                                                                     |                                                                                                                                                                                                                                                                                                                      |
|---------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Course Name:                                                     |                                                                                                                                                                                                                                                                                                                      |
| Wastewater treatment                                                |                                                                                                                                                                                                                                                                                                                      |
| 2. Course Code:                                                     |                                                                                                                                                                                                                                                                                                                      |
| EnvTch41                                                            |                                                                                                                                                                                                                                                                                                                      |
| 3. Semester / Year:                                                 |                                                                                                                                                                                                                                                                                                                      |
| 2025-2026                                                           |                                                                                                                                                                                                                                                                                                                      |
| 4. Description Preparation Date:                                    |                                                                                                                                                                                                                                                                                                                      |
|                                                                     |                                                                                                                                                                                                                                                                                                                      |
| 5. Available Attendance Forms:                                      |                                                                                                                                                                                                                                                                                                                      |
|                                                                     |                                                                                                                                                                                                                                                                                                                      |
| 6. Number of Credit Hours (Total) / Number of Units (Total)         |                                                                                                                                                                                                                                                                                                                      |
|                                                                     |                                                                                                                                                                                                                                                                                                                      |
| 7. Course administrator's name (mention all, if more than one name) |                                                                                                                                                                                                                                                                                                                      |
| Name: Assistant professor Dr. Rasha Khalid                          |                                                                                                                                                                                                                                                                                                                      |
| Email:                                                              |                                                                                                                                                                                                                                                                                                                      |
| 8. Course Objectives                                                |                                                                                                                                                                                                                                                                                                                      |
| <b>Course Objectives</b>                                            | <ul style="list-style-type: none"> <li>- Introducing the student to the types of wastewater.</li> <br/> <li>- This course covers the fundamentals of wastewater treatment and management.</li> <br/> <li>- Introducing the student to the characteristics of wastewater, especially municipal wastewater.</li> </ul> |

|  |                                                                                                                                                                                                                                                                                                                                                                         |
|--|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <ul style="list-style-type: none"> <li>- How is this waste treated?</li> <li>- How are wastewater treatment plants designed?</li> <li>- How can wastewater be disposed of safely in the environment?</li> <li>- Developing problem-solving skills and understanding wastewater applications.</li> <li>- Performing design calculations for treatment plants.</li> </ul> |
|--|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## 9. Teaching and Learning Strategies

|                 |                                                                                                                                                                                                                                                                                                                                                                         |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Strategy</b> | The main strategy to be adopted in delivering this unit is to encourage students to participate in exercises, while simultaneously improving and expanding their critical thinking skills. This will be achieved through interactive lessons and educational programs, and by considering simple experiments that include sampling activities relevant to the students. |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## 10. Course Structure

| Week | Hours | Required Learning Outcomes | Unit or subject name | Learning method | Evaluation method |
|------|-------|----------------------------|----------------------|-----------------|-------------------|
|      |       |                            |                      |                 |                   |

## 11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily, monthly, or written exams, reports ....etc

## 12. Learning and Teaching Resources

Required textbooks (curricular books, if any)

Main references (sources)

Water and Wastewater Treatment and Disposal by Metcalf and Eddy

Recommended books and references  
(scientific journals, reports...)

Water Supply and Sewerage System by Mc Ghee and Steel

Electronic References, Websites

<https://ocw.mit.edu/courses/1-85-water-and-wastewater-treatment-engineering-spring-2006/pages/lecture-notes/>

## Course Description Form

|                                                                     |                                                                                                                                                                                                                                                                                     |
|---------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Course Name:                                                     |                                                                                                                                                                                                                                                                                     |
| Water reuse                                                         |                                                                                                                                                                                                                                                                                     |
| 2. Course Code:                                                     |                                                                                                                                                                                                                                                                                     |
| EnvTch47                                                            |                                                                                                                                                                                                                                                                                     |
| 3. Semester / Year:                                                 |                                                                                                                                                                                                                                                                                     |
| 2025-2026                                                           |                                                                                                                                                                                                                                                                                     |
| 4. Description Preparation Date:                                    |                                                                                                                                                                                                                                                                                     |
|                                                                     |                                                                                                                                                                                                                                                                                     |
| 5. Available Attendance Forms:                                      |                                                                                                                                                                                                                                                                                     |
|                                                                     |                                                                                                                                                                                                                                                                                     |
| 6. Number of Credit Hours (Total) / Number of Units (Total)         |                                                                                                                                                                                                                                                                                     |
|                                                                     |                                                                                                                                                                                                                                                                                     |
| 7. Course administrator's name (mention all, if more than one name) |                                                                                                                                                                                                                                                                                     |
| Name: Assistant lecturer Omar K. Aldeen                             |                                                                                                                                                                                                                                                                                     |
| Email: omar.k.aldeen@uomosul.edu.iq                                 |                                                                                                                                                                                                                                                                                     |
| 8. Course Objectives                                                |                                                                                                                                                                                                                                                                                     |
| <b>Course Objectives</b>                                            | Understanding the importance of water reuse for agricultural and industrial purposes, groundwater recharge, and various other uses, and understanding how to treat wastewater to make it suitable for other uses according to the required specifications for the intended purpose. |
| 9. Teaching and Learning Strategies                                 |                                                                                                                                                                                                                                                                                     |

|                 |                                                                                                                                                                                                                                                                                                                                                                         |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Strategy</b> | The main strategy to be adopted in delivering this unit is to encourage students to participate in exercises, while simultaneously improving and expanding their critical thinking skills. This will be achieved through interactive lessons and educational programs, and by considering simple experiments that include sampling activities relevant to the students. |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

#### 10. Course Structure

| Week | Hours | Required Learning Outcomes | Unit or subject name | Learning method | Evaluation method |
|------|-------|----------------------------|----------------------|-----------------|-------------------|
|      |       |                            |                      |                 |                   |

#### 11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily, monthly, or written exams, reports ....etc

#### 12. Learning and Teaching Resources

|                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-----------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Required textbooks (curricular books, if any) |                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Main references (sources)                     | <p><b>-Metcalf and Eddy, (2003) .Wastewater engineering –treatment and reuse (2003), CHP.13</b></p> <ul style="list-style-type: none"> <li>- <b>-M et al (2010), Urban and Industrial Water Treatment,</b></li> <li>- <b>-Reuse And Recycling – Part A - Educational Module 6.2: Industrial Water Reuse and Recycling – Wastewater</b></li> </ul> <p><b>-Treatment and Recycling Technologies Smith, chp.6, Sustainable Water Solutions Climate Change Adaptation</b></p> |

|                                                                       |                                                                                                                                                                                                                                                              |
|-----------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Recommended books and references<br>(scientific journals, reports...) | <p><b>-DAVIS, R., HIRJI, R., (2005) WATER RESOURCES AND ENVIRONMENT TECHNICAL NOTE F.3: Wastewater Reuse,</b></p> <p><b>-The International Bank for Reconstruction and Development/THE WORLD BANK 1818 H Street, N.W., Washington, D.C. 20433, U.S.A</b></p> |
| Electronic References, Websites                                       |                                                                                                                                                                                                                                                              |