# MODULE DESCRIPTION FORM

# نموذج وصف المادة الدراسية

| Module Information<br>معلومات المادة الدراسية | | | | | |
|---|---|---|---|---|---|
| **Module Title** | Design of Water Treatment Units | | | **Module Delivery** | |
| **Module Type** | Core | | | ☒ **Theory**<br>☐ **Lecture**<br>☐ **Lab**<br>☒ **Tutorial**<br>☐ **Practical**<br>☐ **Seminar** | |
| **Module Code** | ENV411 | | | | |
| **ECTS Credits** | 6 | | | | |
| **SWL (hr/sem)** | 150 | | | | |
| **Module Level** | 4 | | **Semester of Delivery** | 7 | |
| **Administering Department** | ENV8 | | **College** | ENG4 | |
| **Module Leader** | Musab A. Altamir | | **e-mail** | Musabaltamir@uomosul.edu.iq | |
| **Module Leader's Acad. Title** | Assist. Professor | | **Module Leader's Qualification** | M. Sc. | |
| **Module Tutor** | Layth A. Alanaz | | **e-mail** | laythabdulaleem@uomosul.edu.iq | |
| **Peer Reviewer Name** | ------ | | **e-mail** | E-mail | |
| **Scientific Committee Approval Date** | 12/06/2023 | | **Version Number** | 1.0 | |

| Relation with other Modules<br>العلاقة مع المواد الدراسية الأخرى | | | |
|---|---|---|---|
| **Prerequisite module** | Unit Operations and Processes | **Semester** | 5 |
| **Co-requisites module** | None | **Semester** | |

| Module Aims, Learning Outcomes and Indicative Contents<br>أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية | |
|---|---|
| **Module Objectives**<br>أهداف المادة الدراسية | The aim of this course is to introduce the students to the area of water treatment facilities used in Water Treatment Plant (WTPs) and its design. The course will cover the conventional and advance Water Supply Treatment Units Operation and Process focusing on the design of these units, in addition to the sludge treatment and handling facilities. At the end of the course the students will have a working knowledge of the Drinking water treatment units and have the skills to perform a complete process design of a water treatment plant. This will be achieved through descriptive lectures with design projects and supervised tutorials. |

| | |
|---|---|
| **Module Learning Outcomes**<br><br>مخرجات التعلم للمادة الدراسية | **CLO-1:** Recognize the common physical and chemical unit operations encountered in water treatment processes (i)<br>**CLO-2**: Apply the basic concepts of sciences and engineering to solve issues associated with the treatment of water (i)<br>**CLO-3:** Formulate a preliminary design of water treatment plant including conventional and unconventional treatment units (ii)<br>**CLO-4:** Develop and solve design problems and analyze the data to evaluate the feasibility of a components of the water treatment plant (ii).<br>**CLO-5:** Report the data obtained from the site visits to WTP that will be organized during the course (iv)<br>**CLO-6:** Demonstrate the ability to lead and productively participate in group situations via assigning multidisciplinary design projects for specific Water Unit Processes (vii) |
| **Indicative Contents**<br>المحتويات الإرشادية | Part A – Conventional Water Treatment:<br>Conventional unit operation: Design of Intake, Coagulation and Flocculation units, sedimentation unit, Filtration unit and Disinfection unit. (30 hrs)<br>Part B – Advance Water Treatment:<br>Lime Soda ash softening, Reverse Osmoses (RO) and membrane filtration, Ion Exchange. (20 hrs)<br>Part C – Sludge Management and Treatment:<br>Quantity and characteristics of sludge, volume reduction, flow equalization, chemicals recovery, hydraulic calculations, thickening processes, conditioning processes, dewatering; mechanical and nonmechanical processes. (15 hrs) |

## Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

| | |
|---|---|
| **Strategies** | This course has several components that include lectures, individual & group assignments, field visits and e-learning platforms. Exercises involving the use of to understand specific unit processes. The course will be taught in English, and all mandatory assignments have to be submitted within the deadlines to be admitted to the exams. |

## Student Workload (SWL)
الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

| | | | |
|---|---|---|---|
| **Structured SWL (h/sem)**<br>الحمل الدراسي المنتظم للطالب خلال الفصل | 63 | **Structured SWL (h/w)**<br>الحمل الدراسي المنتظم للطالب أسبوعيا | 4.2 |
| **Unstructured SWL (h/sem)**<br>الحمل الدراسي غير المنتظم للطالب خلال الفصل | 87 | **Unstructured SWL (h/w)**<br>الحمل الدراسي غير المنتظم للطالب أسبوعيا | 5.8 |
| **Total SWL (h/sem)**<br>الحمل الدراسي الكلي للطالب خلال الفصل | **150** | | |

## Module Evaluation
تقييم المادة الدراسية

| | | Time/Number | Weight (Marks) | Week Due | Relevant Learning Outcome |
|---|---|---|---|---|---|
| **Formative assessment** | **Quizzes** | 5 | 10 % (10) | 3, 5, 7 ,10 and 13 | CLO-1, CLO-2, CLO-3, CLO-3, CLO-3 |
| | **Assignments** | 5 | 10 % (10) | 3, 5, 7, 10, and 13 | CLO-2, CLO-3, CLO-3, CLO-3, CLO-3 |
| | **Projects** | 1 | 5 % (5) | 8 | CLO-2 to CLO-6 |
| | **Report** | 1 | 5 % (4) | 10 | All |
| **Summative assessment** | **Midterm Exam** | 2hr | 10 % (20) | 8 | CLO-1, CLO -2 and CLO-3 |
| | **Final Exam** | 3hr | 50% (50) | 16 | All |
| **Total assessment** | | | 100% (100 Marks) | | |

## Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

| | **Material Covered** |
|---|---|
| **Week 1** | Introduction, objectives, general consideration of water treatment plant planning and design |
| **Week 2** | Intake unit design, which include intake structure type, rack and fine sceens, intake pipe. |
| **Week 3** | Coagulation, coagulation theory, coagulant types, velocity gradient concept, design of coagulation basin. |
| **Week 4** | Flocculation, design of flocculation basin. |
| **Week 5** | Sedimentation, geometry of settling basin, design of settling basin. |
| **Week 6** | Filtration, filteration theory, classification of filters, back washing, design filters unit |
| **Week 7** | Disinfection, types of disinfectents, Ct concepts, design of disinfection basin. |
| **Week 8** | Advance treatment, clasifecation and types of advance treatments. |
| **Week 9** | Lime Soda softening, defenitions, calculation of quantity of lime and soda ash. |
| **Week 10** | Reverse Osmosis, defenitions, types of memberance, design of memberance modules. |
| **Week 11** | Ion Exchange, theory of ion exchange, design fo ion exchge reactors. |
| **Week 12** | Removal of Iron and manganese, defenitions, materials used in removals, design of unit basins. |
| **Week 13** | Quantity and quality of Sludge. |
| **Week 14** | Thickening of processes and Conditioning processes, theory and design of units process and operation. |
| **Week 15** | Dewatering; mechanical and nonmechanical processes, units type, design concepts. |
| **Week 16** | **Preparatory week before the final Exam** |

## Learning and Teaching Resources

مصادر التعلم والتدريس

| | Text | Available in the Library? |
|---|---|---|
| **Required Texts** | • Qasim, S. R, Motley, E. M. and Zhu, G., (2010). "Water works engineering planning, design and operation", Prentice Hall PTR. | Yes |
| **Recommended Texts** | • John C. C., et. al., 2012, MWH's water treatment principles and design, 3rd edition, John Wiley & Sons Inc. | Yes |
| **Websites** | https://uomosul.edu.iq/en/engineering/environmental-engineering-dept/ | |

## Grading Scheme

مخطط الدرجات

| Group | Grade | التقدير | Marks % | Definition |
|---|---|---|---|---|
| **Success Group (50 - 100)** | **A** - Excellent | امتياز | 90 - 100 | Outstanding Performance |
| | **B** - Very Good | جيد جدا | 80 - 89 | Above average with some errors |
| | **C** - Good | جيد | 70 - 79 | Sound work with notable errors |
| | **D** - Satisfactory | متوسط | 60 - 69 | Fair but with major shortcomings |
| | **E** - Sufficient | مقبول | 50 - 59 | Work meets minimum criteria |
| **Fail Group (0 – 49)** | **FX** – Fail | راسب (قيد المعالجة) | (45-49) | More work required but credit awarded |
| | **F** – Fail | راسب | (0-44) | Considerable amount of work required |
| | | | | |

**Note:** Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

# MODULE DESCRIPTION FORM

# نموذج وصف المادة الدراسية

| Module Information<br>معلومات المادة الدراسية | | | | | |
|---|---|---|---|---|---|
| **Module Title** | Wastewater Treatment Plants Design | | | **Module Delivery** | |
| **Module Type** | Core | | | ☒ **Theory**<br>☐ **Lecture**<br>☐ **Lab**<br>☒ **Tutorial**<br>☒ **Practical**<br>☐ **Seminar** | |
| **Module Code** | ENV412 | | | | |
| **ECTS Credits** | 7 | | | | |
| **SWL (hr/sem)** | 175 | | | | |
| **Module Level** | | 4 | **Semester of Delivery** | | 7 |
| **Administering Department** | | ENV8 | **College** | ENG4 | |
| **Module Leader** | Dr.Ammar | | **e-mail** | Dr.ammarthamir@uomosul.edu.iq | |
| **Module Leader's Acad. Title** | | Assist. Professor | **Module Leader's Qualification** | | Ph.D. |
| **Module Tutor** | ----- | | **e-mail** | E-mail | |
| **Peer Reviewer Name** | | ------ | **e-mail** | E-mail | |
| **Scientific Committee Approval Date** | | 12/06/2023 | **Version Number** | | 1.0 |

| Relation with other Modules<br>العلاقة مع المواد الدراسية الأخرى | | | |
|---|---|---|---|
| **Prerequisite module** | Unit Operations and Processes | **Semester** | 5 |
| **Co-requisites module** | None | **Semester** | |

| Module Aims, Learning Outcomes and Indicative Contents<br>أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية | |
|---|---|
| **Module Objectives**<br>أهداف المادة الدراسية | The aim of this course is to introduce the students to the area of wastewater treatment plant operation and design. The course will cover wastewater treatment plant units train focusing on the design of preliminary, primary, secondary, and tertiary treatment processes in addition to the sludge treatment and handling facilities. At the end of the course the students will have a working knowledge of the wastewater treatment units and have the skills to perform a complete process and hydraulic design of a treatment plant. This will be achieved through descriptive lectures with design projects and supervised tutorials. |
| **Module Learning Outcomes**<br><br>مخرجات التعلم للمادة الدراسية | **CLO-1:** Recognize the common physical, chemical and biological unit operations encountered in treatment processes (i)<br>**CLO-2**: Apply the basic concepts of sciences and engineering to solve issues associated with the treatment of wastewater (i)<br>**CLO-3:** Formulate a preliminary design of wastewater treatment plant including preliminary, primary, secondary, and tertiary treatment units (ii)<br>**CLO-4:** Develop and solve design problems and analyze the data to evaluate the feasibility of a components of the wastewater treatment plant (ii).<br>**CLO-5:** Report the data obtained from the site visits to WWTP that will be organized during the course (iv)<br>**CLO-6:** Demonstrate the ability to lead and productively participate in group situations via assigning multidisciplinary design projects for specific wastewater unit processes (vii) |
| **Indicative Contents**<br>المحتويات الإرشادية | <u>Part A – Preliminary and primary treatment</u><br>Preliminary unit operation: Design of Screening, Grit removal and sedimentations (20 hrs)<br><br><u>Part B – Secondary treatment</u><br>Fundamentals of biological treatment, Design of suspended and attached growth biological treatment systems, description of simplified waster treatment systems (20 hrs)<br><br><u>Part C – Tertiary and advanced treatment</u><br>Design of disinfection units: Chlorination, Ozonation, Nutrient removal processes and advanced wastewater treatment processes (15 hrs)<br><br><u>Part D - Sludge handling and treatment</u><br>Sludge quantities and characteristics, Design of thickener, digester and drying beds (20 hrs) |

| Learning and Teaching Strategies |
|---|

| استراتيجيات التعلم والتعليم | |
|---|---|
| **Strategies** | This course has several components that include lectures, individual & group assignments, field visits and e-learning platforms. Exercises involving the use of computer applications tools to understand specific unit processes. The course will be taught in English, and all mandatory assignments have to be submitted within the deadlines to be admitted to the exams. |

| **Student Workload (SWL)**<br>الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا | | | |
|---|---|---|---|
| **Structured SWL (h/sem)**<br>الحمل الدراسي المنتظم للطالب خلال الفصل | 78 | **Structured SWL (h/w)**<br>الحمل الدراسي المنتظم للطالب أسبوعيا | 5.2 |
| **Unstructured SWL (h/sem)**<br>الحمل الدراسي غير المنتظم للطالب خلال الفصل | 97 | **Unstructured SWL (h/w)**<br>الحمل الدراسي غير المنتظم للطالب أسبوعيا | 6.5 |
| **Total SWL (h/sem)**<br>الحمل الدراسي الكلي للطالب خلال الفصل | **175** | | |

| **Module Evaluation**<br>تقييم المادة الدراسية | | | | | |
|---|---|---|---|---|---|
| | | **Time/Number** | **Weight (Marks)** | **Week Due** | **Relevant Learning Outcome** |
| **Formative assessment** | **Quizzes** | 4 | 16 % (16) | 1, 5, ,12 and 14 | CLO-1, CLO-1, CLO-2, CLO-2 |
| | **Assignments** | 5 | 15 % (15) | 2, 3, 4, 6, and 10 | CLO-2, CLO-2, CLO-3, CLO-2, CLO-3 |
| | **Projects** | 1 | 5 % (5) | 13 | CLO-2 to CLO-6 |
| | **Report** | 1 | 4 % (4) | | All |
| **Summative assessment** | **Midterm Exam** | 2hr | 10% (10) | 7 | CLO-1, CLO -2 and CLO-3 |
| | **Final Exam** | 3hr | 50% (50) | 16 | All |
| **Total assessment** | | | 100% (100 Marks) | | |

| **Delivery Plan (Weekly Syllabus)**<br>المنهاج الاسبوعي النظري |
|---|

| | Material Covered |
|---|---|
| **Week 1** | Introduction, objectives, general consideration of wastewater treatment plant planning and design |
| **Week 2** | Preliminary unit operation: Screening and collection pit |
| **Week 3** | Design of Grit chamber facilities |
| **Week 4** | Primary unit operation (PST) Design |
| **Week 5** | Fundamentals of biological treatment |
| **Week 6** | Design of suspended growth units: Activated sludge processes and modifications |
| **Week 7** | Attached Growth systems: Trickling filter, |
| **Week 8** | Simplified Systems of waste water Treatment: Aerated lagoons, Stabilization ponds |
| **Week 9** | Design of disinfection units: Chlorination, Ozonation, UV disinfection |
| **Week 10** | Biological Nutrient removal |
| **Week 11** | Advanced Treatment |
| **Week 12** | Sludge Handling and treatment |
| **Week 13** | Design of gravity thickeners |
| **Week 14** | Design of anaerobic Digesters |
| **Week 15** | Dewatering units: Design of Drying Beds |
| **Week 16** | **Preparatory week before the final Exam** |

## Learning and Teaching Resources
مصادر التعلم والتدريس

| | Text | Available in the Library? |
|---|---|---|
| **Required Texts** | • Metcalf and Eddy "Wastewater engineering, treatment and resource recovery", McGraw hill, New York, 2014 | Yes |
| **Recommended Texts** | • S. Qasim and G. Zhu "Wastewater Treatment and Reuse Theory and Design Examples Volume 1: Principles and Basic Treatment" , Taylor & Francis Group, 2018 | Yes |
| **Websites** | https://uomosul.edu.iq/en/engineering/environmental-engineering-dept/ | |

## Grading Scheme
مخطط الدرجات

| Group | Grade | التقدير | Marks % | Definition |
|---|---|---|---|---|
| **Success Group** | **A -** Excellent | امتياز | 90 - 100 | Outstanding Performance |

| | | | | |
|---|---|---|---|---|
| **(50 - 100)** | **B -** Very Good | جيد جدا | 80 - 89 | Above average with some errors |
| | **C -** Good | جيد | 70 - 79 | Sound work with notable errors |
| | **D -** Satisfactory | متوسط | 60 - 69 | Fair but with major shortcomings |
| | **E -** Sufficient | مقبول | 50 - 59 | Work meets minimum criteria |
| **Fail Group (0 – 49)** | **FX –** Fail | راسب (قيد المعالجة) | (45-49) | More work required but credit awarded |
| | **F –** Fail | راسب | (0-44) | Considerable amount of work required |
| | | | | |

**Note:** Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

# MODULE DESCRIPTION FORM

# نموذج وصف المادة الدراسية

| Module Information<br>معلومات المادة الدراسية | | | | | |
|---|---|---|---|---|---|
| **Module Title** | Structural Design | | | **Module Delivery** | |
| **Module Type** | Core | | | ☒ **Theory**<br>☐ **Lecture**<br>☐ **Lab**<br>☒ **Tutorial**<br>☐ **Practical**<br>☐ **Seminar** | |
| **Module Code** | ENV413 | | | | |
| **ECTS Credits** | 7 | | | | |
| **SWL (hr/sem)** | 175 | | | | |
| **Module Level** | 4 | | **Semester of Delivery** | 7 | |
| **Administering Department** | ENV8 | | **College** | ENG4 | |
| **Module Leader** | Dr. Mohammed T. A.,<br>Dr. Samir Yasso | | **e-mail** | mohammed1979eng@uomosul.edu.iq<br>syasso@uomosul.edu.iq | |
| **Module Leader's Acad. Title** | Assistant Professor,<br>Lecturer | | **Module Leader's Qualification** | Ph.D. | |
| **Module Tutor** | ----- | | **e-mail** | E-mail | |
| **Peer Reviewer Name** | ------ | | **e-mail** | E-mail | |
| **Scientific Committee Approval Date** | 12/06/2023 | | **Version Number** | 1.0 | |

| Relation with other Modules<br>العلاقة مع المواد الدراسية الأخرى | | | |
|---|---|---|---|
| **Prerequisite module** | Reinforced Concrete | **Semester** | 6 |
| **Co-requisites module** | None | **Semester** | |

| Module Aims, Learning Outcomes and Indicative Contents<br>أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية | |
|---|---|
| **Module Objectives**<br>أهداف المادة الدراسية | An introduction to the reinforced concrete structure and foundation engineering, Characteristics of reinforced concrete elements, Concrete types, Steel Grades, and Loading types. Design of different structural elements subjected to flexure and shear using load and resistance factor design method (LRFD). Design of continuous one-way slabs and beams using ACI coefficients method. Design of two-way slabs using coefficients method. Bearing capacity and foundation types, and analysis and design of wall, spread, and raft footings. Structural design of liquid retaining structures using PCA method, and the design of reinforced concrete retaining Walls. The topics will be covered according to the American Building Code. |
| **Module Learning Outcomes**<br><br>مخرجات التعلم للمادة الدراسية | Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks.<br>1. Identify the mechanical properties of concrete, and reinforcements. *(i)*<br>2. Learning types of foundations and producing designs. *(i), (ii)*<br>3. Identify the analysis and design Codes. *(i)*<br>4. Identify the behavior of reinforced concrete based on ultimate loads. *(i)*<br>5. Produce the design of simple beams and slabs by ultimate strength design method. *(i), (ii)*<br>6. Produce the design of continuous beams and one-way slabs. *(i), (ii)*<br>7. Produce the design of two-way slabs. *(i), (ii)*<br>8. Produce the design of footings. *(i), (ii)*<br>9. Produce the design of liquid retaining structures. *(i), (ii)* |
| **Indicative Contents**<br>المحتويات الإرشادية | Indicative content includes the following.<br><u>Part A – Design codes and design methods and bearing capacity</u><br>Defining design codes and methods of design according to American Standards in addition to the bearing capacity (18 hrs)<br><br><u>Part B – Analysis and design</u><br>Analysis and design of different structural elements including: one-way continuous slab, two-way slab, continuous beams, retaining walls, footings. (54 hrs)<br><br><u>Part C – Liquid retaining structures and raft foundations</u><br>Analysis and design of liquid retaining structures according on the American Code and using the PCA method- including circular and rectangular tanks and raft foundations. (18 hrs) |

| Learning and Teaching Strategies<br>استراتيجيات التعلم والتعليم | |
|---|---|
| **Strategies** | This course has several components that include lectures, individual assignments, field visits- when possible and e-learning platforms. The course will be taught in English, and all mandatory assignments have to be submitted within the deadlines to be admitted to the exams. |

| Student Workload (SWL)<br>الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا | | | |
|---|---|---|---|
| **Structured SWL (h/sem)**<br>الحمل الدراسي المنتظم للطالب خلال الفصل | 93 | **Structured SWL (h/w)**<br>الحمل الدراسي المنتظم للطالب أسبوعيا | 6.2 |
| **Unstructured SWL (h/sem)**<br>الحمل الدراسي غير المنتظم للطالب خلال الفصل | 82 | **Unstructured SWL (h/w)**<br>الحمل الدراسي غير المنتظم للطالب أسبوعيا | 5.5 |
| **Total SWL (h/sem)**<br>الحمل الدراسي الكلي للطالب خلال الفصل | **175** | | |

| Module Evaluation<br>تقييم المادة الدراسية | | | | | |
|---|---|---|---|---|---|
| | | **Time/Number** | **Weight (Marks)** | **Week Due** | **Relevant Learning Outcome** |
| **Formative assessment** | **Quizzes** | 4 | 20 % (20) | 3, 5, ,11 and 13 | 1 to 8 |
| | **Assignments** | 4 | 15 % (15) | 2, 3, 6, and 10 | 1 to 9 |
| **Summative assessment** | **Midterm Exam** | 2hr | 15% (15) | 7 | 1 to 5 |
| | **Final Exam** | 3hr | 50% (50) | 16 | All |
| **Total assessment** | | | 100% (100 Marks) | | |

| Delivery Plan (Weekly Syllabus)<br>المنهاج الاسبوعي النظري | |
|---|---|
| | **Material Covered** |
| **Week 1** | Introduction to concrete structures, materials, design codes, and design loads.<br>Introduction to foundation engineering. |
| **Week 2** | Loads on structures and design methodology.<br>Bearing capacity of the soil. |
| **Week 3** | Introduction to ACI coefficient method for analysis of continuous one-way slabs and beams.<br>Bearing capacity of the soil- cont. |
| **Week 4** | Analysis and design of continuous one-way slabs.<br>Design of spread footing. |
| **Week 5** | Analysis and design of continuous one-way slabs-Cont.<br>Design of spread footing- cont. |
| **Week 6** | Analysis and design of continuous beams.<br>Design of spread footing- cont. |
| **Week 7** | Introduction to analysis and design of two-way slabs using the ACI coefficient method.<br>Design of wall footing. |
| **Week 8** | Analysis and design of two-way slabs-Cont.<br>Design of spread footing- cont. |
| **Week 9** | Design of spread footing- cont. |
| **Week 10** | Introduction to retaining walls. |
| **Week 11** | Analysis and design of cantilever retaining walls.<br>Analysis and design of combined footing. |
| **Week 12** | Analysis and design of cantilever retaining walls.<br>Analysis and design of combined footing- cont. |
| **Week 13** | Introduction to liquid retaining structures.<br>Design of raft foundation. |
| **Week 14** | Analysis and design of liquid retaining structures using PCA method.<br>Design of raft foundation-cont. |
| **Week 15** | Analysis and design of liquid retaining structures using PCA method- cont.<br>Design of raft foundation-cont. |
| **Week 16** | **Preparatory week before the final Exam** |

| Learning and Teaching Resources<br>مصادر التعلم والتدريس | | |
|---|---|---|
| | **Text** | **Available in the Library?** |
| **Required Texts** | Design of Concrete Structures by Nilson, Darwin, and Dolan, 14th edition.<br>B.M. Das, principles of geotechnical engineering( 2006 )<br>B.M. Das, principles of geotechnical engineering( 2014 ) | Yes |
| **Recommended Texts** | Design of Reinforced Concrete, Jack McCormac and Russell Brown, 10th edition. | Yes |
| **Design Codes** | ACI-318-14M, Building Code Requirements 2014, American Concrete Institute.<br>ASCE 7-10, Minimum Design Loads for Buildings and Other Structures. | Yes |
| **Websites** | https://uomosul.edu.iq/en/engineering/environmental-engineering-dept/ | |

| Grading Scheme<br>مخطط الدرجات | | | | |
|---|---|---|---|---|
| **Group** | **Grade** | التقدير | **Marks %** | **Definition** |
| **Success Group (50 - 100)** | **A -** Excellent | امتياز | 90 - 100 | Outstanding Performance |
| | **B -** Very Good | جيد جدا | 80 - 89 | Above average with some errors |
| | **C -** Good | جيد | 70 - 79 | Sound work with notable errors |
| | **D -** Satisfactory | متوسط | 60 - 69 | Fair but with major shortcomings |
| | **E -** Sufficient | مقبول | 50 - 59 | Work meets minimum criteria |
| **Fail Group (0 – 49)** | **FX –** Fail | راسب (قيد المعالجة) | (45-49) | More work required but credit awarded |
| | **F –** Fail | راسب | (0-44) | Considerable amount of work required |
| | | | | |

**Note:** Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

# MODULE DESCRIPTION FORM

# نموذج وصف المادة الدراسية

| **Module Information**<br>معلومات المادة الدراسية | | | | | |
|---|---|---|---|---|---|
| **Module Title** | Engineering Project management and economy | | | **Module Delivery** | |
| **Module Type** | Core | | | ☒ **Theory**<br>☒ **Lecture**<br>☐ **Lab**<br>☐ **Tutorial**<br>☐ **Practical**<br>☐ **Seminar** | |
| **Module Code** | ENV414 | | | | |
| **ECTS Credits** | 5 | | | | |
| **SWL (hr/sem)** | 125 | | | | |
| **Module Level** | | 4 | **Semester of Delivery** | | 7 |
| **Administering Department** | | ENV8 | **College** | ENG4 | |
| **Module Leader** | Dr. Kaythar A. Ibrahim<br>Dr. Hamid Idrees<br>Dr. Anas Fakhry Qassid | | **e-mail** | Kaythar6871@uomosul.edu.iq<br>hamidalkhashab@uomosul.edu.iq<br>anasfq@uomosul.edu.iq | |
| **Module Leader's Acad. Title** | | Lecturer | **Module Leader's Qualification** | | Ph.D. |
| **Module Tutor** | | | **e-mail** | | |
| **Peer Reviewer Name** | | | **e-mail** | | |
| **Scientific Committee Approval Date** | | 12/06/2023 | **Version Number** | | 1.0 |

| **Relation with other Modules**<br>العلاقة مع المواد الدراسية الأخرى | | | |
|---|---|---|---|
| **Prerequisite module** | None | **Semester** | |
| **Co-requisites module** | None | **Semester** | |

| Module Aims, Learning Outcomes and Indicative Contents<br>أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية | |
|---|---|
| **Module Objectives**<br>أهداف المادة الدراسية | This course covers the fundamental concepts and applied techniques to manage project resources effectively and deliver on schedule. Course content addresses fundamental methods for planning, scheduling, organizing, controlling projects. Though project management is universally applicable. Student will learn project management principles and methods with special focus on planning, controlling, and managing projects. Course topics will primarily be the technical aspects of project management Examples include developing the project plan; schedules, and the critical path, resources and resources levelling, MS Project software, S-Curve and cash flow & Evaluating Project cost and schedule performance (Earned Value). Furthermore. This course also, covers the principles of project evaluation; analysis of capital and operating costs of engineering alternatives, benefit-cost ratio; break-even studies, evaluations recognizing risk, replacement and retirement of assets; tax considerations, influence of sources of funds. |
| **Module Learning Outcomes**<br><br>مخرجات التعلم للمادة الدراسية | Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks.<br>**CLO-1:** Listing and recognizing project activities and critical paths, bidding document and contract agreement (i)<br>**CLO-2**: Understanding the principles of project management and the construction works stages, types of construction contract, management level and project control (i)<br>**CLO-3:** Using Microsoft Project software to schedule the project activities, updating projects, Levelling the resources, getting reports & Printing. (ii)<br>**CLO-4** Integrating the time and cost of the project. (ii).<br>**CLO-5** Organizing project work progress. (ii)<br>**CLO-6:** Judging the project efficiency depending on time and budget. (ii)<br>**CLO-7:** Planning and tracking the project. (ii)<br>**CLO-8:** Formulating cash flow of projects (ii)<br>**CLO-9:** Apply the concepts of time-value of money, taking into consideration the impact of interest on investment decisions by comparing between potential candidates and identifying the better investment (i)<br>**CLO-10:** Evaluate different project/investment opportunities to select the most beneficial by applying the appropriate evaluation method (ii)<br>**CLO-11:** Demonstrate understanding that assets having different life expectancies cannot be directly compared through use of common life concepts or by using annual worth comparisons (i)<br>**CLO-12:** Evaluate different project/investment opportunities to select the most beneficial by applying the appropriate evaluation method (ii)<br>**CLO-13:** Determine the book value of an asset for accounting and tax purposes by applying knowledge of depreciation (i) |

| | |
|---|---|
| | **CLO-14:** Understand basic accounting concepts through identification of elements of a balance sheet and income statement (ii)<br>**CLO-15:** Determine the feasibility study of an engineering project through the application of after-tax cash flow analysis using capital tax factors, capital salvage factors, tax rates, and depreciation rates (vii) |
| **Indicative Contents**<br>المحتويات الإرشادية | Indicative content includes the following.<br>Part A – Introduction to the project management.<br>Definition of the project, Stages of construction project, bidding documents, contract agreement, construction project team, Types of construction contract, management level, project control, Introduction to engineering economics, and compound interest (15 hrs)<br>Part B – Project Scheduling.<br>Construction project planning technique, work breakdown structure, task relationship, Determination of project tasks, breaking down the project into tasks, Ghant chart, Scheduling projects using Critical path method. Choice between alternatives include: present worth method, annual equivalent method, and other comparatives (25 hrs)<br>Part C MS Project Software<br>Scheduling the project and assigning resource using MS Project software, project updating and Tracking. Study of Inflation, replacement, and sensitivity analysis (20 hrs)<br>Part D – Formulating S-curve & Project cash flow. Calculate work progress Evaluating Project. cost and schedule performance (Earned Value). Study value engineering analysis, and decision tree (15 hrs) |

| **Learning and Teaching Strategies**<br>استراتيجيات التعلم والتعليم | |
|---|---|
| **Strategies** | This course has several components that include lectures, assignments, exams. Exercises involving the use of MS project software. The course will be taught in English, and all mandatory assignments have to be submitted within the deadlines to be admitted to the exams. |

| **Student Workload (SWL)**<br>الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا | | | |
|---|---|---|---|
| **Structured SWL (h/sem)**<br>الحمل الدراسي المنتظم للطالب خلال الفصل | 78 | **Structured SWL (h/w)**<br>الحمل الدراسي المنتظم للطالب أسبوعيا | 5.2 |
| **Unstructured SWL (h/sem)**<br>الحمل الدراسي غير المنتظم للطالب خلال الفصل | 47 | **Unstructured SWL (h/w)**<br>الحمل الدراسي غير المنتظم للطالب أسبوعيا | 3.1 |
| **Total SWL (h/sem)**<br>الحمل الدراسي الكلي للطالب خلال الفصل | **125** | | |

| Module Evaluation<br>تقييم المادة الدراسية | | | | | |
|---|---|---|---|---|---|
| | | **Time/Number** | **Weight (Marks)** | **Week Due** | **Relevant Learning Outcome** |
| **Formative assessment** | **Quizzes** | 4 | 40 % (40) | 3, 4, 12 & 13 | 1 &2b (CLO-1, CLO -2), 2 (ALL) |
| | **Assignments** | 0 | 0 | | |
| | **Projects / Lab.** | 0 | 0 | | |
| | **Report** | 0 | 0 | | |
| **Summative assessment** | **Midterm Exam** | 2hr | 10% (10) | 8 | All |
| | **Final Exam** | 3hr | 50% (50) | 16 | All |
| **Total assessment** | | | 100% (100 Marks) | | |

| Delivery Plan (Weekly Syllabus)<br>المنهاج الاسبوعي النظري | |
|---|---|
| | **Material Covered** |
| **Week 1** | Introduction, Definition of the project, Aim of project management and Stages of construction project. |
| | Introduction, Interest Formulas snd Their Applications |
| **Week 2** | Bidding documents, Contract agreement and Construction project team. |
| | Choice between alternatives, Present worth method |
| **Week 3** | Quiz 1, Types of construction contract, Management level and Project control. |
| | Annual equivalent method |
| **Week 4** | Construction project planning technique, Work breakdown structure, Breaking down the project into tasks & Determination of tasks duration. |
| | Quiz 2, Depreciation |
| **Week 5** | Task relationship, Ghant chart, Critical path method and Precedence method. |
| | Cost/Benefit Criterion |
| **Week 6** | Scheduling by Critical path method. |
| | Average rate of return |
| **Week 7** | Project time control (Project Updating). |
| | The Payback (Pay-Out) Period |
| **Week 8** | Mid-Term Exam, Time-cost trade-off. |
| **Week 9** | MS Project software: Introduction, Scheduling projects. |
| | Analysis using rate of return (Irr), and minimum attractive rate of return (Marr) |

| | |
|---|---|
| **Week 10** | MS Project software: Resources allocation and assignment, Schedule updating & Tracking |
| | Sensitivity analysis |
| **Week 11** | MS Project Software: Reports and Printing |
| | Replacement and maintenance analysis |
| **Week 12** | MS Project Software: Quiz 3. |
| | Inflation adjusted decisions |
| **Week 13** | S-curve & Project cash flow. Work progress calculation |
| | Quiz 4, value analysis /value engineering |
| **Week 14** | Project cost and schedule performance (Earned Value). |
| | Decision Tree |
| **Week 15** | Project cost and schedule performance (Earned Value). |
| | Application examples in decision tree |
| **Week 16** | **Preparatory week before the final Exam** |

| **Delivery Plan (Weekly Lab. Syllabus)**<br>المنهاج الاسبوعي للمختبر | |
|---|---|
| | **Material Covered** |
| **Week 1** | |
| **Week 2** | |
| **Week 3** | |
| **Week 4** | |
| **Week 5** | |
| **Week 6** | |
| **Week 7** | |

| **Learning and Teaching Resources**<br>مصادر التعلم والتدريس | | |
|---|---|---|
| | **Text** | **Available in the Library?** |
| **Required Texts** | K. K. Chitkara “Construction Project Management 3rd Edition, Kindle Edition” Mc Graw Hill education, INDIA, 2014. | |
| **Recommended Texts** | S. Seetharaman" Construction Engineering and Management fifth edition", UMESH publications, 2015.<br>R. Panneerselvam "Engineering Economics", PHI Learning Private Limited, New Delhi, 2001 | |
| **Websites** | https://uomosul.edu.iq/en/engineering/environmental-engineering-dept/ | |

| Grading Scheme<br>مخطط الدرجات | | | | |
|---|---|---|---|---|
| **Group** | **Grade** | التقدير | **Marks %** | **Definition** |
| **Success Group (50 - 100)** | **A -** Excellent | امتياز | 90 - 100 | Outstanding Performance |
| | **B -** Very Good | جيد جدا | 80 - 89 | Above average with some errors |
| | **C -** Good | جيد | 70 - 79 | Sound work with notable errors |
| | **D -** Satisfactory | متوسط | 60 - 69 | Fair but with major shortcomings |
| | **E -** Sufficient | مقبول | 50 - 59 | Work meets minimum criteria |
| **Fail Group (0 – 49)** | **FX –** Fail | راسب (قيد المعالجة) | (45-49) | More work required but credit awarded |
| | **F –** Fail | راسب | (0-44) | Considerable amount of work required |
| | | | | |

**Note:** Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

# MODULE DESCRIPTION FORM

# نموذج وصف المادة الدراسية

| Module Information<br>معلومات المادة الدراسية | | | | | |
|---|---|---|---|---|---|
| **Module Title** | Engineering project and technical writing | | | **Module Delivery** | |
| **Module Type** | Core | | | ☒**Theory**<br>☐**Lecture**<br>☐**Lab**<br>☒**Tutorial**<br>☐**Practical**<br>☐**Seminar** | |
| **Module Code** | ENV415 | | | | |
| **ECTS Credits** | 3 | | | | |
| **SWL (hr/sem)** | 75 | | | | |
| **Module Level** | 4 | | **Semester of Delivery** | 7 | |
| **Administering Department** | ENV8 | | **College** | ENG4 | |
| **Module Leader** | | | **e-mail** | | |
| **Module Leader's Acad. Title** | | | **Module Leader's Qualification** | | |
| **Module Tutor** | ----- | | **e-mail** | E-mail | |
| **Peer Reviewer Name** | ------ | | **e-mail** | E-mail | |
| **Scientific Committee Approval Date** | 12/06/2023 | | **Version Number** | 1.0 | |

| Relation with other Modules<br>العلاقة مع المواد الدراسية الأخرى | | | |
|---|---|---|---|
| **Prerequisite module** | None | **Semester** | |
| **Co-requisites module** | None | **Semester** | |

| Module Aims, Learning Outcomes and Indicative Contents<br>أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية | |
|---|---|
| **Module Objectives**<br>أهداف المادة الدراسية | The aim of the first part of this course is technical writing which include developing students' knowledge and understanding of the role and conduct of descriptive research methods. Intellectual and methodological debates will be discussed in order to assist students to develop informed opinions and a critical appreciation for other's research. The imperative for ethical research practice will be presented. The course equips students with the skills to review and conduct methodologically sound research as a part of their professional work. Students develop the skills to recognize and reflect on the strengths and limitations of different research methodologies, understand the links between theory and practice, critically assess research, and address ethical and practical issues. The course takes a step-by-step approach to manage and analyze data (including computer assisted), and how to write up and present findings are core components of this course. Students will be equipped with the knowledge and ability to undertake original research projects and develop a set of transferable workplace skills.<br>The aim of the second part of this course is executing a project which include applying the principles of design relating to the subject of concern project. Then the student will apply the basics that have been learned in the first part in the writing the project that will submitted. |
| **Module Learning Outcomes**<br><br>مخرجات التعلم للمادة الدراسية | Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks.<br>**CLO-1:** Define research; explain and apply research terms; describe the research process and the principal activities, skills and ethics associated with the research process (i, v)<br>**CLO-2:** Applying the basic concepts of design required in the project (ii).<br>**CLO-3:** Demonstrate knowledge of research processes (reading, evaluating, and developing) (vi);<br>**CLO-4:** Perform literature reviews using print and online databases (vi);<br>**CLO-5:** Identify, explain, compare, and prepare the key elements of a research report (i);<br>**CLO-6:** Develop their ability to skillfully communicate orally with a gathering of people (iv);<br>**CLO-7:** Choose relevant research knowledge to successfully complete their research report components of a program (i)**;**<br>**CLO-8:** Analyze the components of research report (i);<br>**CLO-9:** Develop their ability to work adequately on teams and to set up objectives, plan activities, meet due dates (vii) |
| **Indicative Contents**<br>المحتويات الإرشادية | Indicative content includes the following.<br>Part A – Introduction<br>Important Course Rules and Policies, design of research report, and how to formulate the title of research report (3 hrs).<br><br>Part B – Research preparation<br>Data gathering and collection, how to check reliability of literatures, research report makeup, Research ethics and avoid plagiarism (5 hrs).<br><br>Part C – Writing and presenting |

| | |
|---|---|
| | How to write an introduction?, formatting figures and tables, using of (word office) in report writing and formatting, Citation, referencing, how to present the research report? (7 hrs). |

| Learning and Teaching Strategies<br>استراتيجيات التعلم والتعليم | |
|---|---|
| **Strategies** | This course has several components that include lectures, individual & group assignments, field visits and e-learning platforms to development the ability and skills of students to writing the and presenting the report . Project involving the use of computer applications tools to design the project items. |

| Student Workload (SWL)<br>الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا | | | |
|---|---|---|---|
| **Structured SWL (h/sem)**<br>الحمل الدراسي المنتظم للطالب خلال الفصل | 48 | **Structured SWL (h/w)**<br>الحمل الدراسي المنتظم للطالب أسبوعيا | 3.2 |
| **Unstructured SWL (h/sem)**<br>الحمل الدراسي غير المنتظم للطالب خلال الفصل | 27 | **Unstructured SWL (h/w)**<br>الحمل الدراسي غير المنتظم للطالب أسبوعيا | 1.8 |
| **Total SWL (h/sem)**<br>الحمل الدراسي الكلي للطالب خلال الفصل | **75** | | |

| Module Evaluation<br>تقييم المادة الدراسية | | | | | |
|---|---|---|---|---|---|
| | | **Time/Number** | **Weight (Marks)** | **Week Due** | **Relevant Learning Outcome** |
| **Formative assessment** | **Quizzes** | 6 | 20 % (20) | 3,5, 7, ,9,11, and 12 | CLO-1, CLO-3, CLO-4, CLO-5, CLO-6, CLO-7 |
| | **Assignments** | 1 | 3 | 2 | CLO-2 |
| | **Projects** | 1 | 17% (20) | 13 | All |
| | **Report** | | | | |
| **Summative assessment** | **Midterm Exam** | 2hr | 10% (10) | 13 | All |
| | **Final Exam** | 3hr | 50% (50) | 16 | All |
| **Total assessment** | | | 100% (100 Marks) | | |

| Delivery Plan (Weekly Syllabus)<br>المنهاج الاسبوعي النظري | |
|---|---|
| | **Material Covered** |
| **Week 1** | Introduction to class: Important Course Rules and Policies |
| **Week 2** | Design of research report |
| **Week 3** | How to formulate the title of research report |
| **Week 4** | Research plan preparation: Data gathering and collection |
| **Week 5** | How to check reliability of literatures |
| **Week 6** | How to arrangement collecting data in different chapters |
| **Week 7** | Research report makeup |
| **Week 8** | Research ethics and avoid plagiarism |
| **Week 9** | How to write an introduction? |
| **Week 10** | Formatting figures and tables |
| **Week 11** | Using of (word office) in report writing and formatting |
| **Week 12** | Citation |
| **Week 13** | Referencing |
| **Week 14** | How to present the research report? |
| **Week 15** | Using of (power point office) in presentation |
| **Week 16** | **Preparatory week before the final Exam** |

| Delivery Plan (Weekly Lab. Syllabus)<br>المنهاج الاسبوعي للمختبر | |
|---|---|
| | **Material Covered** |
| **Week 1** | |
| **Week 2** | |
| **Week 3** | |
| **Week 4** | |
| **Week 5** | |
| **Week 6** | |
| **Week 7** | |

| Learning and Teaching Resources<br>مصادر التعلم والتدريس | | |
|---|---|---|
| | **Text** | **Available in the Library?** |
| **Required Texts** | Research Methodology: A Step-by-Step Guide for Beginners, Sage Publications Ltd. By Ranjit Kumar | Yes |
| **Recommended Texts** | | |
| **Websites** | https://uomosul.edu.iq/en/engineering/environmental-engineering-dept/ | |

| Grading Scheme<br>مخطط الدرجات | | | | |
|---|---|---|---|---|
| **Group** | **Grade** | التقدير | **Marks %** | **Definition** |
| **Success Group (50 - 100)** | **A** - Excellent | امتياز | 90 - 100 | Outstanding Performance |
| | **B** - Very Good | جيد جدا | 80 - 89 | Above average with some errors |
| | **C** - Good | جيد | 70 - 79 | Sound work with notable errors |
| | **D** - Satisfactory | متوسط | 60 - 69 | Fair but with major shortcomings |
| | **E** - Sufficient | مقبول | 50 - 59 | Work meets minimum criteria |
| **Fail Group (0 – 49)** | **FX** – Fail | راسب (قيد المعالجة) | (45-49) | More work required but credit awarded |
| | **F** – Fail | راسب | (0-44) | Considerable amount of work required |
| | | | | |

**Note:** Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

# MODULE DESCRIPTION FORM

# نموذج وصف المادة الدراسية

| Module Information<br>معلومات المادة الدراسية | | | | | |
|---|---|---|---|---|---|
| **Module Title** | Industrial and Petroleum Liquid Waste | | | **Module Delivery** | |
| **Module Type** | Core | | | ☒ **Theory**<br>☐ **Lecture**<br>☐ **Lab**<br>☐ **Tutorial**<br>☒ **Practical**<br>☐ **Seminar** | |
| **Module Code** | ENV421 | | | | |
| **ECTS Credits** | 6 | | | | |
| **SWL (hr/sem)** | 150 | | | | |
| **Module Level** | 4 | | **Semester of Delivery** | 8 | |
| **Administering Department** | ENV8 | | **College** | ENG4 | |
| **Module Leader** | Dr. Mohammed Salim Shihab,<br>Dr. Hamed I. Al-Khashab | | **e-mail** | Shihab77@uomosul.edu.iq<br>hamidalkhashab@uomosul.edu.iq | |
| **Module Leader's Acad. Title** | Lecturer | | **Module Leader's Qualification** | Ph.D. | |
| **Module Tutor** | Nada Abd Al-Razzaq Al-Dulaimi | | **e-mail** | nada.abd@uomosul.edu.iq | |
| **Peer Reviewer Name** | ------ | | **e-mail** | E-mail | |
| **Scientific Committee Approval Date** | 12/06/2023 | | **Version Number** | 1.0 | |

| Relation with other Modules<br>العلاقة مع المواد الدراسية الأخرى | | | |
|---|---|---|---|
| **Prerequisite module** | Wastewater Treatment Plant Design | **Semester** | 7 |
| **Co-requisites module** | None | **Semester** | ------ |

| Module Aims, Learning Outcomes and Indicative Contents<br>أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية | |
|---|---|
| **Module Objectives**<br>أهداف المادة الدراسية | The aim of this course is to define the characteristics of industrial wastewater, manufacturing processes, and management strategies for pollution prevention and waste minimization; In-plant survey; Identifying wastewater generating operations; Preparing mass balance, calculations for industrial operations, In-plant control; Industrial water conserving and recycling. The course will cover Industrial wastewater treatment technologies (Equalization, Floatation, Neutralization, Microfiltration), Studying of selected wastewater industries and wastewater treatment. |
| **Module Learning Outcomes**<br><br>مخرجات التعلم للمادة الدراسية | Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks.<br>**CLO-1:** Analysis the industrial activity and identify the environmental problems. (i)<br>**CLO-2:** Plan strategies to control and reduce pollution. (i)<br>**CLO-3:** Design the most appropriate technique to control and treat industrial pollution. (ii)<br>**CLO-4:** Apply environmental management systems (EMS) to an industrial activity. (vii)<br>**CLO-5:** Evaluate different treatment methods to select the most beneficial (ii)<br>**CLO-6:** Optimizing the manufacturing processes to reduce the discharged wastes (ii) |
| **Indicative Contents**<br>المحتويات الإرشادية | Indicative content includes the following.<br><u>Part A – Industrail Survey</u><br>Introduction, Characteristics of industrial wastewater, In-plant survey; Identifying wastewater generating operations; Preparing mass balance calculations for industrial operations, In-plant control; Volume and strength reduction (12 hrs)<br><br><u>Part B – Industrial wastewater treatment technologies:</u><br>Neutralization, Equalization unit, Flotation unit, Microfiltration process (Membrane) (12 hrs)<br><br><u>Part C – Selected Industries study</u><br>Dairy industry, Textile industry, Tannery industry, Soft drinks industry (21 hrs) |

| Learning and Teaching Strategies<br>استراتيجيات التعلم والتعليم | |
|---|---|
| **Strategies** | This course has several components that include lectures, individual assignments, and e-learning platforms. Exercises involving problems. The course will be taught in English, and all mandatory assignments have to be submitted within the deadlines to be admitted to the exams. |

| Student Workload (SWL)<br>الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا | | | |
|---|---|---|---|
| **Structured SWL (h/sem)**<br>الحمل الدراسي المنتظم للطالب خلال الفصل | 63 | **Structured SWL (h/w)**<br>الحمل الدراسي المنتظم للطالب أسبوعيا | 4.2 |
| **Unstructured SWL (h/sem)**<br>الحمل الدراسي غير المنتظم للطالب خلال الفصل | 87 | **Unstructured SWL (h/w)**<br>الحمل الدراسي غير المنتظم للطالب أسبوعيا | 5.8 |
| **Total SWL (h/sem)**<br>الحمل الدراسي الكلي للطالب خلال الفصل | **150** | | |

| Module Evaluation<br>تقييم المادة الدراسية | | | | | |
|---|---|---|---|---|---|
| | | **Time/Number** | **Weight (Marks)** | **Week Due** | **Relevant Learning Outcome** |
| **Formative assessment** | **Quizzes** | 4 | 16 % (16) | 2, 5, ,7 ,17 | CLO-1, CLO-2, CLO-3, CLO-3 |
| | **Assignments** | 4 | 16 % (16) | 5, 8, and 12 | CLO-2, CLO-3,CLO-4 CLO-6 |
| | **Projects / Lab.** | 1 | 18% (18) | All | All |
| | **Report** | ------ | ------ | ----- | ---------- |
| **Summative assessment** | **Midterm Exam** | 2hr | 10% (10) | 10 | CLO-1, CLO-2, CLO-3, CLO-4 |
| | **Final Exam** | 3hr | 50% (50) | 16 | All |
| **Total assessment** | | | 100% (100 Marks) | | |

| Delivery Plan (Weekly Syllabus)<br>المنهاج الاسبوعي النظري | |
|---|---|
| | **Material Covered** |
| **Week 1** | Introduction, Characteristics of industrial wastewater. |
| **Week 2** | In-plant survey; Identifying wastewater generating operations; |
| **Week 3** | Preparing mass balance calculations for industrial operations |
| **Week 4** | In-plant control; Volume and strength reduction |
| **Week 5** | Industrial wastewater treatment technologies: Neutralization, |
| **Week 6** | Equalization unit |
| **Week 7** | Flotation unit |
| **Week 8** | Microfiltration process (Membrane) |
| **Week 9** | Studying of selected wastewater industries: Dairy industry |
| **Week 10** | Textile industry |
| **Week 11** | Tannery industry |
| **Week 12** | Soft drinks industry |
| **Week 13** | Sources of pollutants in petroleum industry, refineries quantity and characteristics |
| **Week 14** | Pollution reduction inside the refinery-API separator |
| **Week 15** | Project presentation |
| **Week 16** | **Preparatory week before the final Exam** |

| Delivery Plan (Weekly Lab. Syllabus)<br>المنهاج الاسبوعي للمختبر | |
|---|---|
| | **Material Covered** |
| **Week 1** | |
| **Week 2** | |
| **Week 3** | |
| **Week 4** | |
| **Week 5** | |
| **Week 6** | |
| **Week 7** | |

| Learning and Teaching Resources<br>مصادر التعلم والتدريس | | |
|---|---|---|
| | **Text** | **Available in the Library?** |
| **Required Texts** | • Nemerow L. N., " Industrial Waste Treatment", Elsevier Science & Technology Books, Netherlands, 2006<br>• Eckenfelder W.W "Industrial pollution control, Mc Graw Hill Int. 3rd Ed.,2000. | Yes |
| **Recommended Texts** | • Metcalf and Eddy- "wastewater engineering-treatment and reuse " 4th edition ,2004. | Yes |
| **Websites** | | |

| Grading Scheme<br>مخطط الدرجات | | | | |
|---|---|---|---|---|
| **Group** | **Grade** | التقدير | **Marks %** | **Definition** |
| **Success Group (50 - 100)** | **A** - Excellent | امتياز | 90 - 100 | Outstanding Performance |
| | **B** - Very Good | جيد جدا | 80 - 89 | Above average with some errors |
| | **C** - Good | جيد | 70 - 79 | Sound work with notable errors |
| | **D** - Satisfactory | متوسط | 60 - 69 | Fair but with major shortcomings |
| | **E** - Sufficient | مقبول | 50 - 59 | Work meets minimum criteria |
| **Fail Group (0 – 49)** | **FX** – Fail | راسب (قيد المعالجة) | (45-49) | More work required but credit awarded |
| | **F** – Fail | راسب | (0-44) | Considerable amount of work required |
| | | | | |

**Note:** Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

# MODULE DESCRIPTION FORM

# نموذج وصف المادة الدراسية

| Module Information<br>معلومات المادة الدراسية | | | | | |
|---|---|---|---|---|---|
| **Module Title** | Soil and Ground Water Pollution | | | **Module Delivery** | |
| **Module Type** | Core | | | ☒ **Theory**<br>☐**Lecture**<br>☒ **Lab**<br>☐ **Tutorial**<br>☐ **Practical**<br>☐ **Seminar** | |
| **Module Code** | ENV422 | | | | |
| **ECTS Credits** | 5 | | | | |
| **SWL (hr/sem)** | 125 | | | | |
| **Module Level** | 4 | | **Semester of Delivery** | 8 | |
| **Administering Department** | ENV8 | | **College** | ENG4 | |
| **Module Leader** | Dr. Anas Fakhry Qassid<br>Dr. Ayman Waleed | | **e-mail** | anasfq@uomosul.edu.iq<br>aymanwaleed1975@uomosul.edu.iq | |
| **Module Leader's Acad. Title** | Lecturer | | **Module Leader's Qualification** | Ph.D. | |
| **Module Tutor** | | | **e-mail** | | |
| **Peer Reviewer Name** | | | **e-mail** | | |
| **Scientific Committee Approval Date** | 14/06/2023 | | **Version Number** | 1.0 | |

| Relation with other Modules<br>العلاقة مع المواد الدراسية الأخرى | | | |
|---|---|---|---|
| **Prerequisite module** | None | **Semester** | |
| **Co-requisites module** | None | **Semester** | |

| Module Aims, Learning Outcomes and Indicative Contents<br>أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية | |
|---|---|
| **Module Objectives**<br>أهداف المادة الدراسية | Knowledge of the behavior of compounds in soil and their effects on organisms (human beings, plants, soil biota) is required in order to assess soil quality and to select proper soil remediation methods in case of severe pollution. The field of application is not limited to soil but includes sediments and solid wastes. The course focuses on soil risk assessment (soil quality evaluation) and the basic knowledge necessary to be able to apply a risk assessment procedure to polluted soil sites. Basic knowledge comprises compound behavior in soils (speciation, transport, uptake) and effects on soil organisms (bioavailability, uptake, dose-response relationships, risk assessment). Speciation focuses on adsorption to soil particles and on complexation reactions: mechanism and modeling, especially of heavy metals with (dissolved) organic matter. |
| **Module Learning Outcomes**<br>مخرجات التعلم للمادة الدراسية | **CLO-1:** Explain the legal, planning and environmental health issues in relation to redevelopment of contaminated sites; (i)<br>**CLO-2**: Explain the main scientific and engineering principles of soil and groundwater remediation; (i)<br>**CLO-3:** Apply knowledge in water and land conservation projects (ii)<br>**CLO-4:** Design and plan a remediation of polluted soils; (ii)<br>**CLO-5:** Complete a risk analysis of a contaminated site; (vii)<br>**CLO-6:** Apply Geostudio -2007 – software to predict transport of soil pollution. (ii) |
| **Indicative Contents**<br>المحتويات الإرشادية | Part A – Introduction to Soil composition, its structure, types of soils, Study a properties of soil (6 hrs) .<br>Part B – Basic chemistry which related to soil pollution and groundwater (6 hrs)<br>Part C Sources, role, and behavior of substances in soil and water (6 hrs)<br>Part D – Transport processes of substances in soil and water (6 hrs)<br>Part E – Soil Analysis for soil pollution (30 hrs)<br>Part E – Soil pollution Remediation (6 hrs) |

| Learning and Teaching Strategies<br>استراتيجيات التعلم والتعليم | |
|---|---|
| **Strategies** | This course has several components that include lectures, assignments, exams. Exercises and introduce a report for soil pollution analysis for each student groups. The course will be taught in Arabic, and all mandatory assignments have to be submitted within the deadlines to be admitted to the exams. |

| Student Workload (SWL)<br>الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا | | | |
|---|---|---|---|
| **Structured SWL (h/sem)**<br>الحمل الدراسي المنتظم للطالب خلال الفصل | 63 | **Structured SWL (h/w)**<br>الحمل الدراسي المنتظم للطالب أسبوعيا | 4.2 |
| **Unstructured SWL (h/sem)**<br>الحمل الدراسي غير المنتظم للطالب خلال الفصل | 62 | **Unstructured SWL (h/w)**<br>الحمل الدراسي غير المنتظم للطالب أسبوعيا | 4.1 |
| **Total SWL (h/sem)**<br>الحمل الدراسي الكلي للطالب خلال الفصل | **125** | | |

| Module Evaluation<br>تقييم المادة الدراسية | | | | | |
|---|---|---|---|---|---|
| | | **Time/Number** | **Weight (Marks)** | **Week Due** | **Relevant Learning Outcome** |
| **Formative assessment** | **Quizzes** | 4 | 16% | 4, 6, 9, and 14 | 1 (CLO-1, CLO -2), 2 (CLO-1), 3 (CLO-2, CLO-3), 4(COL-1,CLO-2,CLO-3,CLO-4) |
| | **Assignments** | 2 | 4% | 6, and 13 | 1 (CLO-1, CLO -2), 2 (All), |
| | **Projects / Lab.** | 1 | 20% | 2,3,4,5,6,7,8,9, 10,11,12,13,14, and 15 | All weeks (CLO-1, CLO-2, CLO-3, and CLO-5) |
| | **Report** | 0 | 0 | | |
| **Summative assessment** | **Midterm Exam** | 2hr | 10% | 12 | (CLO-1, CLO-2, CLO-3, CLO-4, CLO-5) |
| | **Final Exam** | 3hr | 50% | 16 | All |
| **Total assessment** | | | 100% | | |

| Delivery Plan (Weekly Syllabus)<br>المنهاج الاسبوعي النظري | |
|---|---|
| | **Material Covered** |
| **Week 1** | Environmental Pollution, Environmental Pollutants |
| **Week 2** | The Origin of Soil, Soil constituents, Soil Properties, and Soil Types and Classification |
| **Week 3** | Basic Environmental Chemistry – Introduction, Activity |
| **Week 4** | Basic Environmental Chemistry -Background thermodynamics introduction |
| **Week 5** | Basic Environmental Chemistry – Fugacity, Chemical Equilibrium and kinetics |
| **Week 6** | Application examples about composition of solid waste |
| **Week 7** | Soil Pollution, Sources, causes and effects |
| **Week 8** | Behavior of substances in Soil- Solid phase constituents, and dissolved phase constituents |
| **Week 9** | Behavior of substances in Soil- Organic materials, and Nutrients |
| **Week 10** | Behavior of substances in Soil- Heavy metals |
| **Week 11** | Mid-Term Exam - Time-cost trade-off. |
| **Week 12** | Soil remediation |
| **Week 13** | Mass transport processes, and Flick's law |
| **Week 14** | Diffusion in porous media, dispersion |
| **Week 15** | Application of Geostudio Software in mass transport to soil contamination problems |
| **Week 16** | **Preparatory week before the final Exam** |

| Delivery Plan (Weekly Lab. Syllabus)<br>المنهاج الاسبوعي للمختبر | |
|---|---|
| | **Material Covered** |
| **Week 1** | Introduction, collection of samples |
| **Week 2** | Laboratory Safety – explaining MSDS |
| **Week 3** | Physical analysis of soil – Moisture content and Moisture Factor |
| **Week 4** | Volumetric distribution of soil components , and Determination of soil texture |
| **Week 5** | Chemical Analysis of soil- pH |
| **Week 6** | Electro-Conductivity |
| **Week 7** | Calcium Carbonate ($CaCo_3$) Determination |
| **Week 8** | Organic Material |
| **Week 9** | **Midterm Exam** |
| **Week 10** | Cationic Exchange Capacity (CEC) |
| **Week 11** | Gypsum ($CaSO_4.2H_2O$) |
| **Week 12** | Sodium $Na^+$, Potassium $K^+$, Calcium $Ca^{2+}$, and Magnesium $Mg^{2+}$ Determination |
| **Week 13** | Nutrients – Nitrogen (N) |
| **Week 14** | Nutrients – Phosphor (P) |
| **Week 15** | Soil carbon estimation |
| **Week 16** | **Preparatory week before the final Exam** |

| Learning and Teaching Resources<br>مصادر التعلم والتدريس | | |
|---|---|---|
| | **Text** | **Available in the Library?** |
| **Required Texts** | Marcel van der Perk "Soil and Water Contamination", The M.C. Eschers company, 2006 | yes |
| **Recommended Texts** | Simone Pascucci, " Soil Contamination ", Janeza Trdine 9, 51000 Rijeka, Croatia,2011. | yes |
| **Websites** | https://uomosul.edu.iq/en/engineering/environmental-engineering-dept/ | |

| Grading Scheme<br>مخطط الدرجات | | | | |
|---|---|---|---|---|
| **Group** | **Grade** | التقدير | **Marks %** | **Definition** |
| **Success Group (50 - 100)** | **A -** Excellent | امتياز | 90 - 100 | Outstanding Performance |
| | **B -** Very Good | جيد جدا | 80 - 89 | Above average with some errors |
| | **C -** Good | جيد | 70 - 79 | Sound work with notable errors |
| | **D -** Satisfactory | متوسط | 60 - 69 | Fair but with major shortcomings |
| | **E -** Sufficient | مقبول | 50 - 59 | Work meets minimum criteria |
| **Fail Group (0 – 49)** | **FX –** Fail | راسب (قيد المعالجة) | (45-49) | More work required but credit awarded |
| | **F –** Fail | راسب | (0-44) | Considerable amount of work required |
| | | | | |

**Note:** Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

# MODULE DESCRIPTION FORM

# نموذج وصف المادة الدراسية

| Module Information<br>معلومات المادة الدراسية | | | | | |
|---|---|---|---|---|---|
| **Module Title** | Estimation and Specifications | | | **Module Delivery** | |
| **Module Type** | Core | | | ☒ **Theory**<br>☐ **Lecture**<br>☐ **Lab**<br>☒ **Tutorial**<br>☐ **Practical**<br>☐ **Seminar** | |
| **Module Code** | ENV423 | | | | |
| **ECTS Credits** | 4 | | | | |
| **SWL (hr/sem)** | 100 | | | | |
| **Module Level** | | 4 | **Semester of Delivery** | | 8 |
| **Administering Department** | | ENV8 | **College** | ENG4 | |
| **Module Leader** | Dr. Kaythar A. Ibrahim | | **e-mail** | Kaythar6871@uomosul.edu.iq | |
| **Module Leader's Acad. Title** | | Lecturer | **Module Leader's Qualification** | | Ph.D. |
| **Module Tutor** | ----- | | **e-mail** | E-mail | |
| **Peer Reviewer Name** | | ------ | **e-mail** | E-mail | |
| **Scientific Committee Approval Date** | | 12/06/2023 | **Version Number** | | 1.0 |

| Relation with other Modules<br>العلاقة مع المواد الدراسية الأخرى | | | |
|---|---|---|---|
| **Prerequisite module** | None | **Semester** | |
| **Co-requisites module** | None | **Semester** | |

| Module Aims, Learning Outcomes and Indicative Contents<br>أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية | |
|---|---|
| **Module Objectives**<br>أهداف المادة الدراسية | This course provides a comprehensive understanding of the role of an Estimation in the construction industry. Students will learn the principles, techniques, and practices involved in, with a specific focus on estimation of construction projects element. The course covers quantity & cost estimation. The coarse cover the rough and detailed quantity survey. Measuring soil excavation, volume of concrete, masonry work, RC shuttering, RC steel quantity, construction finishing, sanitary and plumbing element are also covered. The coarse extended to use the excel in estimation. The Bill of quantity, Pricing and cost analysis, project condition and specification are also included in this course. Practical exercises and case studies are included to enhance learning and application of concepts. |
| **Module Learning Outcomes**<br><br>مخرجات التعلم للمادة الدراسية | Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks.<br>**CLO-1:** Listing and recognizing the main principle used in estimation. (i)<br>**CLO-2**: Understanding the general and special specification and conditions.<br>**CLO-3**: Understanding both rough and detailed estimation. (i)<br>**CLO-4:** Using estimation technique for calculation the quantity of construction project elements. (i)<br>**CLO-5** Integrating the computer tools for quantity calculation. (ii).<br>**CLO-6** Evaluating the cost of construction projects elements. (ii)<br>**CLO-7:** Producing different method for measuring quantities. (ii) |
| **Indicative Contents**<br>المحتويات الإرشادية | Indicative content includes the following.<br><u>Part A –</u> Introduction to the project management.<br>Definition & importance of estimation, Quantity sheet, allowance of waste, Accuracy of quantities, prevention of mistakes & Measuring units. Areas & Volumes, Detailed Estimation & Rough Estimation. (6 hrs)<br><u>Part B – Project Scheduling.</u><br>Measuring of Soil Excavation, Concrete volume & composition, blockwork & stonework, steel for RC elements, RC Shuttering, construction finishing, sanitary & plumbing elements (21 hrs)<br><u>Part C MS Project Software</u><br>Pricing, Cost Analysis & Estimation using Excel (9 hrs)<br>Part D – Bill of quantity, general and special projects conditions and specification. (9 hrs) |

| Learning and Teaching Strategies<br>استراتيجيات التعلم والتعليم | |
|---|---|
| **Strategies** | This course has several components that include classes & lectures, exams. Exercises involving the use of Excel software. The course will be taught in English. |

| Student Workload (SWL)<br>الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا | | | |
|---|---|---|---|
| **Structured SWL (h/sem)**<br>الحمل الدراسي المنتظم للطالب خلال الفصل | 48 | **Structured SWL (h/w)**<br>الحمل الدراسي المنتظم للطالب أسبوعيا | 3.2 |
| **Unstructured SWL (h/sem)**<br>الحمل الدراسي غير المنتظم للطالب خلال الفصل | 52 | **Unstructured SWL (h/w)**<br>الحمل الدراسي غير المنتظم للطالب أسبوعيا | 3.5 |
| **Total SWL (h/sem)**<br>الحمل الدراسي الكلي للطالب خلال الفصل | **100** | | |

| Module Evaluation<br>تقييم المادة الدراسية | | | | | |
|---|---|---|---|---|---|
| | | **Time/Number** | **Weight (Marks)** | **Week Due** | **Relevant Learning Outcome** |
| **Formative assessment** | **Quizzes** | 2 | 28 % (28) | 4 and 12 | 1 (CLO-1, CLO -3, CLO -4), 2 (ALL) |
| | **Assignments** | 4 | 12 % (12) | | CLO-3, CLO-4, CLO-4, CLO-6 |
| | **Projects / Lab.** | 0 | 0 | | |
| | **Report** | 0 | 0 | | |
| **Summative assessment** | **Midterm Exam** | 2hr | 10% (10) | 8 | All |
| | **Final Exam** | 3hr | 50% (50) | 16 | All |
| **Total assessment** | | | 100% (100 Marks) | | |

| Delivery Plan (Weekly Syllabus)<br>المنهاج الاسبوعي النظري | |
|---|---|
| | **Material Covered** |
| **Week 1** | Introduction to estimation, Definition & importance of estimation, Quantity sheet, allowance of waste, Accuracy of quantities, prevention of mistakes & Measuring units. |
| **Week 2** | Areas & Volumes, Detailed Estimation & Rough Estimation. |
| **Week 3** | Soil Excavation for: Raft foundation, Piping & manholes, wall footing, swimming pool & Water channel, ...etc. |
| **Week 4** | Measuring of concrete volume & composition according to mix design. Volume of concrete & composition for: footing, water tanks, RC building elements, shaded area, swimming pool, ...etc. |
| **Week 5** | Measuring of blockwork & stonework. |
| **Week 6** | Estimation of quantities of steel & RCC elements for footing, columns, beams, slabs, staircase, …etc. |
| **Week 7** | Measuring of RC Shuttering for footing, columns, beams and slabs, staircase, etc. |
| **Week 8** | Measuring of construction finishing (Plastering, flooring, roofing, ceramic cladding, stone cladding, skirting & painting). Measuring of door & windows |
| **Week 9** | Measuring of sanitary & plumbing elements. |
| **Week 10** | Pricing and Cost Analysis:<br>Introduction to pricing strategies, Cost analysis and rate development. Material and labor cost estimation. Overhead and profit considerations. |
| **Week 11** | Pricing and Cost Analysis:<br>Cost calculation sheet, Determination of construction item price. |
| **Week 12** | Estimation using Excel. |
| **Week 13** | Bill of quantity, general and special projects conditions. |
| **Week 14** | General Specification. |
| **Week 15** | Special Specification. |
| **Week 16** | **Preparatory week before the final Exam** |

| Delivery Plan (Weekly Lab. Syllabus)<br>المنهاج الاسبوعي للمختبر | |
|---|---|
| | **Material Covered** |
| **Week 1** | |
| **Week 2** | |
| **Week 3** | |
| **Week 4** | |
| **Week 5** | |
| **Week 6** | |

| Learning and Teaching Resources<br>مصادر التعلم والتدريس | | |
|---|---|---|
| | **Text** | **Available in the Library?** |
| **Recommended Texts** | B. N. Dutta, "Estimation and Costing in Civil Engineering-Theory and Practice" Twenty-Eight Revised Edition, UBS Publishers, INDIA, 2012. | |
| **Required Texts** | Martin Brook, " Estimating and Tendering for Construction Work ", ELSEVIER, Third Edition, 2004. | |
| **Websites** | https://uomosul.edu.iq/en/engineering/environmental-engineering-dept/ | |

| | |
|---|---|
| **Week 7** | |

| Grading Scheme<br>مخطط الدرجات | | | | |
|---|---|---|---|---|
| **Group** | **Grade** | التقدير | **Marks %** | **Definition** |
| **Success Group (50 - 100)** | **A** - Excellent | امتياز | 90 - 100 | Outstanding Performance |
| | **B** - Very Good | جيد جدا | 80 - 89 | Above average with some errors |
| | **C** - Good | جيد | 70 - 79 | Sound work with notable errors |
| | **D** - Satisfactory | متوسط | 60 - 69 | Fair but with major shortcomings |
| | **E** - Sufficient | مقبول | 50 - 59 | Work meets minimum criteria |
| **Fail Group (0 – 49)** | **FX** – Fail | راسب (قيد المعالجة) | (45-49) | More work required but credit awarded |
| | **F** – Fail | راسب | (0-44) | Considerable amount of work required |
| | | | | |

**Note:** Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

# MODULE DESCRIPTION FORM

# نموذج وصف المادة الدراسية

| Module Information<br>معلومات المادة الدراسية | | | | | |
|---|---|---|---|---|---|
| **Module Title** | Environmental Impact Assessment and Regulations | | | **Module Delivery** | |
| **Module Type** | Core | | | ☒ **Theory**<br>☐ **Lecture**<br>☐ **Lab**<br>☐ **Tutorial**<br>☒ **Practical**<br>☐ **Seminar** | |
| **Module Code** | ENV424 | | | | |
| **ECTS Credits** | 4 | | | | |
| **SWL (hr/sem)** | 100 | | | | |
| **Module Level** | | 4 | **Semester of Delivery** | | 8 |
| **Administering Department** | | ENV8 | **College** | ENG4 | |
| **Module Leader** | Dr. Mohammed S. Shihab | | **e-mail** | Shihab77@uomosul.edu.iq | |
| **Module Leader's Acad. Title** | | Lecturer | **Module Leader's Qualification** | | Ph.D. |
| **Module Tutor** | ----- | | **e-mail** | E-mail | |
| **Peer Reviewer Name** | | ------ | **e-mail** | E-mail | |
| **Scientific Committee Approval Date** | | 12/06/2023 | **Version Number** | | 1.0 |

| Relation with other Modules<br>العلاقة مع المواد الدراسية الأخرى | | | |
|---|---|---|---|
| **Prerequisite module** | None | **Semester** | ----- |
| **Co-requisites module** | None | **Semester** | |

| Module Aims, Learning Outcomes and Indicative Contents<br>أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية | |
|---|---|
| **Module Objectives**<br>أهداف المادة الدراسية | The aim of this course is to define Environmental protection Act, Rules and Standards, EIA guidelines and predict the environmental consequences of human development activities and to plan appropriate measures to eliminate or reduce adverse effects and to augment positive effects. EIA aims to facilitate sustainable development. The course will cover Project Concept / Identification, Project Appraisal and Decision. At the end of the course the students will have a knowledge of the EIA and have the skills to perform a complete analysis and report that can be understood by all the related stakeholders. This will be achieved through descriptive lectures with project assignments. |
| **Module Learning Outcomes**<br><br>مخرجات التعلم للمادة الدراسية | Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks.<br>**CLO-1:** Defining Environmental protection Act, Rules and Standards, EIA guidelines. (i)<br>**CLO-2**: Apply environment impact assessment methods (i)<br>**CLO-3:** Determining and managing the Potential impacts (direct and indirect, individual and cumulative) of projects (i)<br>**CLO-4:** Proposing human actions (projects, plans, programs, legislation, activities) and their alternatives on the environment (i).<br>**CLO-5:** Report the data obtained from the site visits that will be organized during the course (iv)<br>**CLO-6:** Demonstrate the ability to participate in group situations via assigning multidisciplinary EIA for specific projects (vii) |
| **Indicative Contents**<br>المحتويات الإرشادية | Indicative content includes the following.<br><u>Part A – EIA Introduction</u><br>Environmental Protection Acts, Rules, Regulations and Standards (5 hrs)<br><br><u>Part B – Environment Impact Assessment</u><br>Environment Impacts, Identify Activities ,Impact Prediction Methodologies Reviewing of EIA and EMP Reports,(15 hrs)<br><br><u>Part C – Environment Management</u><br>Natural Resources Conservation, Conservation of Energy, Pollution prevention Disposal of Treated effluents Solid Waste Disposal Environmental Audit Concept of green cities (10 hrs) |

| Learning and Teaching Strategies<br>استراتيجيات التعلم والتعليم | |
|---|---|
| **Strategies** | This course has several components that include lectures, individual & group assignments, field visits and e-learning platforms. Exercises involving the use of The course will be taught in English, and all mandatory assignments have to be submitted within the deadlines to be admitted to the exams. |

| Student Workload (SWL)<br>الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا | | | |
|---|---|---|---|
| **Structured SWL (h/sem)**<br>الحمل الدراسي المنتظم للطالب خلال الفصل | 33 | **Structured SWL (h/w)**<br>الحمل الدراسي المنتظم للطالب أسبوعيا | 2.2 |
| **Unstructured SWL (h/sem)**<br>الحمل الدراسي غير المنتظم للطالب خلال الفصل | 67 | **Unstructured SWL (h/w)**<br>الحمل الدراسي غير المنتظم للطالب أسبوعيا | 4.5 |
| **Total SWL (h/sem)**<br>الحمل الدراسي الكلي للطالب خلال الفصل | **100** | | |

| Module Evaluation<br>تقييم المادة الدراسية | | | | | |
|---|---|---|---|---|---|
| | | **Time/Number** | **Weight (Marks)** | **Week Due** | **Relevant Learning Outcome** |
| **Formative assessment** | **Quizzes** | 3 | 10 % (10) | 1, 5, ,12 | CLO-1, CLO-3, CLO-4, |
| | **Assignments** | 3 | 10 % (10) | 2, 6, and 10 | CLO-2, CLO-3, CLO-4, |
| | **Projects / Lab.** | 1 | 20 % (20) | 13 | CLO-2 to CLO-6 |
| | **Report** | 0 | 0 | | ----- |
| **Summative assessment** | **Midterm Exam** | 2hr | 10% (10) | 7 | CLO-1, CLO -2 ,CLO-3, CLO-4 |
| | **Final Exam** | 3hr | 50% (50) | 16 | All |
| **Total assessment** | | | 100% (100 Marks) | | |

| Delivery Plan (Weekly Syllabus)<br>المنهاج الاسبوعي النظري | |
|---|---|
| | **Material Covered** |
| **Week 1** | Introduction, Environmental Protection Acts, Rules, Regulations and Standards |
| **Week 2** | Environmental Impact Assessment: Definition and scope, |
| **Week 3** | Preliminary screening requiring EIA of projects |
| **Week 4** | Impact identification |
| **Week 5** | Assessment of Impact |
| **Week 6** | Impact Evaluation |
| **Week 7** | Types of EIA, rapid and comprehensive |
| **Week 8** | Methods of environment impact assessment; ad-hoc method, |
| **Week 9** | maps and overlays, check lists, matrix, cause condition impacts. |
| **Week 10** | Procedure For EIA Clearance: EIA review and screening; state level screening, |
| **Week 11** | Clearance from DOE and MOEF. |
| **Week 12** | Environmental Management: Preventive policy of environment, |
| **Week 13** | Project presentation |
| **Week 14** | Project presentation |
| **Week 15** | Project presentation |
| **Week 16** | **Preparatory week before the final Exam** |

| Delivery Plan (Weekly Lab. Syllabus)<br>المنهاج الاسبوعي للمختبر | |
|---|---|
| | **Material Covered** |
| **Week 1** | |
| **Week 2** | |
| **Week 3** | |
| **Week 4** | |
| **Week 5** | |
| **Week 6** | |
| **Week 7** | |

| Learning and Teaching Resources |
|---|

| مصادر التعلم والتدريس | | |
|---|---|---|
| | **Text** | **Available in the Library?** |
| **Required Texts** | Teachers Mannual, ENVIRONMENTAL IMPACT ASSESSMENT For Science, Art, Management and Other Post Graduate Courses, 2007 | Yes |
| **Recommended Texts** | Lawrence, David P., Environmental Impact Assessment (Practical Solutions to Recurrent Problems), Wiley International, New Jersey. | Yes |
| **Websites** | https://uomosul.edu.iq/en/engineering/environmental-engineering-dept/ | |

| **Grading Scheme** مخطط الدرجات | | | | |
|---|---|---|---|---|
| **Group** | **Grade** | التقدير | **Marks %** | **Definition** |
| **Success Group (50 - 100)** | **A -** Excellent | امتياز | 90 - 100 | Outstanding Performance |
| | **B -** Very Good | جيد جدا | 80 - 89 | Above average with some errors |
| | **C -** Good | جيد | 70 - 79 | Sound work with notable errors |
| | **D -** Satisfactory | متوسط | 60 - 69 | Fair but with major shortcomings |
| | **E -** Sufficient | مقبول | 50 - 59 | Work meets minimum criteria |
| **Fail Group (0 – 49)** | **FX –** Fail | راسب (قيد المعالجة) | (45-49) | More work required but credit awarded |
| | **F –** Fail | راسب | (0-44) | Considerable amount of work required |
| | | | | |

**Note:** Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

# MODULE DESCRIPTION FORM

# نموذج وصف المادة الدراسية

| Module Information<br>معلومات المادة الدراسية | | | | | |
|---|---|---|---|---|---|
| **Module Title** | Civil Drawing | | | **Module Delivery** | |
| **Module Type** | Core | | | ☒**Theory**<br>☐**Lecture**<br>☒**Lab**<br>☐**Tutorial**<br>☐**Practical**<br>☐**Seminar** | |
| **Module Code** | ENV425 | | | | |
| **ECTS Credits** | 6 | | | | |
| **SWL (hr/sem)** | 150 | | | | |
| **Module Level** | 4 | | **Semester of Delivery** | 8 | |
| **Administering Department** | ENV8 | | **College** | ENG4 | |
| **Module Leader** | Samir Yasso | | **e-mail** | syasso@uomosul.edu.iq | |
| **Module Leader's Acad. Title** | Lecturer | | **Module Leader's Qualification** | Ph.D. | |
| **Module Tutor** | ----- | | **e-mail** | E-mail | |
| **Peer Reviewer Name** | ------ | | **e-mail** | E-mail | |
| **Scientific Committee Approval Date** | 12/06/2023 | | **Version Number** | 1.0 | |

| Relation with other Modules<br>العلاقة مع المواد الدراسية الأخرى | | | |
|---|---|---|---|
| **Prerequisite module** | Drawing by computer, Reinforced Concrete | **Semester** | 2, 6 |
| **Co-requisites module** | None | **Semester** | |

| Module Aims, Learning Outcomes and Indicative Contents<br>أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية | |
|---|---|
| **Module Objectives**<br>أهداف المادة الدراسية | Using AutoCAD to produce technical drawings utilizing the knowledge from past design subjects. The course aims to introduce the technical drawings and format, the structural drawings of different elements like slabs, beams, footings. In addition, the subject will tackle the technical drawings of plumbing. The final goal is for the students to be able to produce technical drawings to interpret the designs carried out by the students. |
| **Module Learning Outcomes**<br><br>مخرجات التعلم للمادة الدراسية | 1. Identify the information required to produce technical drawings. *(i)*<br>2. Distinguish between different types of technical drawings and their requirements. (i)<br>3. Produce structural plans. *(ii)*<br>4. Develop details of structural elements and sections. *(ii)*<br>5. Construct plumbing plans. *(ii)*<br>6. Provide details of plumbing and fittings. *(ii)* |
| **Indicative Contents**<br>المحتويات الإرشادية | Part A – Introduction to technical drawings<br>Introduction to technical drawings and their types. (15 hrs)<br><br>Part B – Structural Drawings<br>Structural details of different structural elements including: one-way continuous slab, two-way slab, continuous beams, and footings. (40 hrs)<br><br>Part C – Plumbing drawings<br>Details and drawings of plumbing plans and fittings. (20 hrs) |

| Learning and Teaching Strategies<br>استراتيجيات التعلم والتعليم | |
|---|---|
| **Strategies** | This course has several components that include lectures, individual assignments, and e-learning platforms. The course will be taught in English, and all mandatory assignments have to be submitted within the deadlines to be admitted to the exams. |

| Student Workload (SWL)<br>الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا | | | |
|---|---|---|---|
| **Structured SWL (h/sem)**<br>الحمل الدراسي المنتظم للطالب خلال الفصل | 78 | **Structured SWL (h/w)**<br>الحمل الدراسي المنتظم للطالب أسبوعيا | 5.2 |
| **Unstructured SWL (h/sem)**<br>الحمل الدراسي غير المنتظم للطالب خلال الفصل | 72 | **Unstructured SWL (h/w)**<br>الحمل الدراسي غير المنتظم للطالب أسبوعيا | 4.8 |
| **Total SWL (h/sem)**<br>الحمل الدراسي الكلي للطالب خلال الفصل | **150** | | |

| Module Evaluation<br>تقييم المادة الدراسية |
|---|

| | | Time/Number | Weight (Marks) | Week Due | Relevant Learning Outcome |
|---|---|---|---|---|---|
| **Formative assessment** | **Quizzes** | 4 | 20 % (20) | 3, 5, ,11 and 13 | All |
| | **Assignments** | 5 | 20 % (20) | 2, 3, 6, and 10 | All |
| **Summative assessment** | **Midterm Exam** | 2hr | 10% (10) | 7 | All |
| | **Final Exam** | 3hr | 50% (50) | 16 | All |
| **Total assessment** | | | 100% (100 Marks) | | |

| **Delivery Plan (Weekly Syllabus)**<br>المنهاج الاسبوعي النظري | |
|---|---|
| | **Material Covered** |
| **Week 1** | Introduction to civil drawings. |
| **Week 2** | Plans details and symbols |
| **Week 3** | Utilizing CAD in civil drawings. |
| **Week 4** | Structural Drawings: Plans |
| **Week 5** | Structural Drawings: Slabs |
| **Week 6** | Structural Drawings: Slabs- cont. |
| **Week 7** | Structural Drawings: Beams |
| **Week 8** | Structural Drawings: Beams- cont. |
| **Week 9** | Structural Drawings: Columns |
| **Week 10** | Structural Drawings: Spread footings |
| **Week 11** | Structural Drawings: Wall footings |
| **Week 12** | Plumbing |
| **Week 13** | Plumbing- cont. |
| **Week 14** | Selected topics |
| **Week 15** | Selected topics |
| **Week 16** | **Preparatory week before the final Exam** |

| **Delivery Plan (Weekly Lab. Syllabus)**<br>المنهاج الاسبوعي للمختبر | |
|---|---|
| | **Material Covered** |

| | |
|---|---|
| **Week 1** | |
| **Week 2** | |
| **Week 3** | |
| **Week 4** | |
| **Week 5** | |
| **Week 6** | |
| **Week 7** | |

## Learning and Teaching Resources
مصادر التعلم والتدريس

| | Text | Available in the Library? |
|---|---|---|
| **Required Texts** | ACI Detailing manual, 2020.<br>Structural Detailing For Architecture, Building and Civil Engineering, 2nd edition, 1991. | Yes |
| **Recommended Texts** | | Yes |
| **Websites** | https://uomosul.edu.iq/en/engineering/environmental-engineering-dept/ | |

## Grading Scheme
مخطط الدرجات

| Group | Grade | التقدير | Marks % | Definition |
|---|---|---|---|---|
| **Success Group (50 - 100)** | **A -** Excellent | امتياز | 90 - 100 | Outstanding Performance |
| | **B -** Very Good | جيد جدا | 80 - 89 | Above average with some errors |
| | **C -** Good | جيد | 70 - 79 | Sound work with notable errors |
| | **D -** Satisfactory | متوسط | 60 - 69 | Fair but with major shortcomings |
| | **E -** Sufficient | مقبول | 50 - 59 | Work meets minimum criteria |
| **Fail Group (0 – 49)** | **FX –** Fail | راسب (قيد المعالجة) | (45-49) | More work required but credit awarded |
| | **F –** Fail | راسب | (0-44) | Considerable amount of work required |
| | | | | |

**Note:** Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

# MODULE DESCRIPTION FORM

# نموذج وصف المادة الدراسية

| Module Information<br>معلومات المادة الدراسية | | | | | |
|---|---|---|---|---|---|
| **Module Title** | Engineering project | | | **Module Delivery** | |
| **Module Type** | Core | | | ☒**Theory**<br>☐**Lecture**<br>☐**Lab**<br>☐**Tutorial**<br>☒**Practical**<br>☐**Seminar** | |
| **Module Code** | ENV426 | | | | |
| **ECTS Credits** | 5 | | | | |
| **SWL (hr/sem)** | 125 | | | | |
| **Module Level** | 4 | | **Semester of Delivery** | 8 | |
| **Administering Department** | ENV8 | | **College** | ENG4 | |
| **Module Leader** | | | **e-mail** | | |
| **Module Leader's Acad. Title** | | | **Module Leader's Qualification** | | |
| **Module Tutor** | ----- | | **e-mail** | E-mail | |
| **Peer Reviewer Name** | ------ | | **e-mail** | E-mail | |
| **Scientific Committee Approval Date** | 12/06/2023 | | **Version Number** | 1.0 | |

| Relation with other Modules<br>العلاقة مع المواد الدراسية الأخرى | | | |
|---|---|---|---|
| **Prerequisite module** | Engineering Project and Technical Writing | **Semester** | 7 |
| **Co-requisites module** | None | **Semester** | |

| Module Aims, Learning Outcomes and Indicative Contents<br>أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية | |
|---|---|
| **Module Objectives**<br>أهداف المادة الدراسية | The aim of this course is executing a project which include applying the principles of design relating to the subject of concern project. Then the student will apply the basics that have been learned in the writing the project that will submitted. |
| **Module Learning Outcomes**<br><br>مخرجات التعلم للمادة الدراسية | Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks.<br>CLO-1: An ability to distinguish, define, identify, formulate, and solve engineering problems by applying principles of engineering science and mathematics (i).<br>CLO-2: An ability to produce engineering designs that meet desired needs within certain constraints by applying both analysis and synthesis in the design process (ii).<br>CLO-3: An ability to skillfully communicate orally with gathering of people and in writing with various managerial levels (iv).<br>CLO-4: An ability to perceive ethical and professional responsibilities in engineering cases and make brilliant judgments taking into account the consequences in worldwide financial, ecological, and societal considerations (v).<br>CLO-5: An ability to perceive the continual necessity for professional knowledge growth and how to find, assess, assemble, and apply it properly (vi).<br>CLO-6: An ability to work adequately on teams and to set up objectives, plan activities, meet due dates, and manage risk and uncertainly (vii). |
| **Indicative Contents**<br>المحتويات الإرشادية | |

| Learning and Teaching Strategies<br>استراتيجيات التعلم والتعليم | |
|---|---|
| **Strategies** | This course has several components that include group team project, field visits and e-learning platforms to guide and follow up the students in applying basic concepts of sciences and engineering to solve issues associated with subject of project. Project may involve the use of computer applications tools to design the project items. At final the student will submit the project as report and he present it orally. |

| Student Workload (SWL)<br>الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا | | | |
|---|---|---|---|
| **Structured SWL (h/sem)**<br>الحمل الدراسي المنتظم للطالب خلال الفصل | 33 | **Structured SWL (h/w)**<br>الحمل الدراسي المنتظم للطالب أسبوعيا | 2.2 |
| **Unstructured SWL (h/sem)**<br>الحمل الدراسي غير المنتظم للطالب خلال الفصل | 92 | **Unstructured SWL (h/w)**<br>الحمل الدراسي غير المنتظم للطالب أسبوعيا | 6.1 |
| **Total SWL (h/sem)**<br>الحمل الدراسي الكلي للطالب خلال الفصل | **125** | | |

## Module Evaluation

تقييم المادة الدراسية

| | | Time/Number | Weight (Marks) | Week Due | Relevant Learning Outcome |
|---|---|---|---|---|---|
| Formative assessment | Quizzes | | | | |
| | Assignments | | | | |
| | Projects | 1 | 40% (40) | All | All |
| | Report | | | | |
| Summative assessment | Midterm Exam | 2hr | 10% (10) | 11 | All |
| | Final Exam | 3hr | 50% (50) | 16 | All |
| Total assessment | | | 100% (100 Marks) | | |

## Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

| | Material Covered |
|---|---|
| Week 1 | |
| Week 2 | |
| Week 3 | |
| Week 4 | |
| Week 5 | |
| Week 6 | |
| Week 7 | |
| Week 8 | |
| Week 9 | |
| Week 10 | |
| Week 11 | |
| Week 12 | |
| Week 13 | |
| Week 14 | |
| Week 15 | |
| Week 16 | |

| Delivery Plan (Weekly Lab. Syllabus)<br>المنهاج الاسبوعي للمختبر | |
|---|---|
| | **Material Covered** |
| **Week 1** | |
| **Week 2** | |
| **Week 3** | |
| **Week 4** | |
| **Week 5** | |
| **Week 6** | |
| **Week 7** | |

| Learning and Teaching Resources<br>مصادر التعلم والتدريس | | |
|---|---|---|
| | **Text** | **Available in the Library?** |
| **Required Texts** | | |
| **Recommended Texts** | | |
| **Websites** | https://uomosul.edu.iq/en/engineering/environmental-engineering-dept/ | |

| Grading Scheme<br>مخطط الدرجات | | | | |
|---|---|---|---|---|
| **Group** | **Grade** | التقدير | **Marks %** | **Definition** |
| **Success Group (50 - 100)** | **A** - Excellent | امتياز | 90 - 100 | Outstanding Performance |
| | **B** - Very Good | جيد جدا | 80 - 89 | Above average with some errors |
| | **C** - Good | جيد | 70 - 79 | Sound work with notable errors |
| | **D** - Satisfactory | متوسط | 60 - 69 | Fair but with major shortcomings |
| | **E** - Sufficient | مقبول | 50 - 59 | Work meets minimum criteria |
| **Fail Group (0 – 49)** | **FX** – Fail | راسب (قيد المعالجة) | (45-49) | More work required but credit awarded |
| | **F** – Fail | راسب | (0-44) | Considerable amount of work required |
| | | | | |

**Note:** Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.