Republic of Iraq - Ministry of Higher Education and Scientific Research
University of Mosul
Bachelor's degree in Dams and Water Resources Engineering (First cycle)
Four years (Eight semesters) - 240 ECTS credits - 1 ECTS = 25hr
Program Curriculum (2024-2025)

جمهورية العراق - وزارة التعليم العالي والبحث العلمي
جامعة الموصل
بكالوريوس في هندسة السدود والموارد المائية (الدورة الأولى)
أربع سنوات (ثمانية فصول دراسية) - 240 وحدة اوربية - كل وحدة اوربية = 25 ساعة
المنهاج الدراسي للعام الدراسي 2025-2024

Level: UG1 — Semester 1

No.	Module Code	اسم المادة الدراسية	Module Name in English	Language	CL (hr/w)	Lect (hr/w)	Lab (hr/w)	Pr (hr/w)	Tut (hr/w)	Semn (hr/w)	Exam hr/sem	SSWL hr/sem	USSWL hr/sem	SWL hr/sem	ECTS	Module Type	Prerequisite Module(s)
1	DWRE 111	الرياضيات I	Mathematics I	English	3	1			2		3	93	82	175	7.00	B	
2	DWRE 112	الميكانيك الهندسي I	Engineering Mechanics I	English	2	1			2		3	78	72	150	6.00	B	
3	DWRE 113	الرسم الهندسي	Engineering Drawing	English			6				3	93	57	150	6.00	B	
4	UOM 1011	اللغة العربية I	Arabic	Arabic	2						3	33	17	50	2.00	B	
5	DWRE 114	مقدمة في هندسة الموارد المائية	Introduction to Water Resources Engineering	Arabic	2	1					3	48	27	75	3.00	C	
6	UOM 1031	حاسوب I	Computer 1	English	1		2				3	48	27	75	3.00	S	
7	DWRE 117	هيدروجيولوجي	Hydrogeology	Arabic	2	1					3	48	27	75	3.00	S	
			Total Weekly Hours	28	12	4	8	0	4	0	21	441	309	750	30.00		

Level: UG1 — Semester 2

No.	Module Code	اسم المادة الدراسية	Module Name in English	Language	CL (hr/w)	Lect (hr/w)	Lab (hr/w)	Pr (hr/w)	Tut (hr/w)	Semn (hr/w)	Exam hr/sem	SSWL hr/sem	USSWL hr/sem	SWL hr/sem	ECTS	Module Type	Prerequisite Module(s)
1	DWRE 121	الرياضيات II	Mathematics II	English	3	1			2		3	93	82	175	7.00	B	
2	DWRE 122	الميكانيك الهندسي II	Engineering Mechanics II	English	2	1			2		3	78	72	150	6.00	B	
3	DWRE 123	الرسم بواسطة الحاسوب	Computer Drawing	English			6				3	93	57	150	6.00	B	
4	DWRE 124	الإحصاء الهندسي	Engineering Statistics	English	1		2				3	48	52	100	4.00	B	
5	DWRE 125	نوعية المياه والتلوث	Water Quality and Pollution	Arabic	1				2		3	48	27	75	3.00	S	
6	UOM 1040	الديمقراطية وحقوق الإنسان	Human Rights and Democracy	Arabic	2						3	33	17	50	2.00	B	
7	UOM 1021	اللغة الإنجليزية I	English 1	English	2						3	33	17	50	2.00	S	
			Total Weekly Hours	27	11	2	8	0	6	0	21	426	324	750	30.00		

Course Description Form

1. Course Name:
Mathematics I

2. Course Code:
DWRE 111

3. Semester / Year:
First/ 2024-2025

4. Description Preparation Date:
1/6/2023

5. Available Attendance Forms:
Lectures in the classroom

6. Number of Credit Hours (Total) / Number of Units (Total)
93 hours/ 7 ECTS credits

7. Course administrator's name (mention all, if more than one name)
Name:Ahmed yahay Abdulhafedh, Email: ahmed.abdulhafedh@uomosul.edu.iq

8. Course Objectives

Course Objectives	Knowledge of the Matrices and determinants, An Overview of the derivatives, Integration, Indefi integral, Integration by substitution, The definite integral, Evaluating definite integrals by substitut Applications of the definite integral, Area between two curves, Volumes by slicing; disks and wash Volumes by cylindrical shells, Length of a plane curve and Area of a surface of revolution.

9. Teaching and Learning Strategies

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

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	6	The student learned how to solve matrices and determinants in several ways	Matrices and determinants	A lecture in the classroom	HW and CW
2	6	The student learned how to derive equations and find the slope	An Overview of the derivatives	A lecture in the classroom	HW, CW, exam
3	6	The student learns how to solve integrals	Integration	A lecture in the classroom	HW, CW, exam
4	6	The student learned to solve indefinite integrals	Indefinite integral	A lecture in the classroom	HW, CW, exam
5	6	The student learned to solve another type of integrals	Integration by substitution,	A lecture in the classroom	HW, CW, exam

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

11. Course Evaluation

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

12. Learning and Teaching Resources

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

Course Description Form

1. Course Name:
Engineering mechanics I

2. Course Code:
DWRE 111

3. Semester / Year:
2/2024−2025

4. Description Preparation Date:
1/9/2023

5. Available Attendance Forms:
Theoretical lectures in class

6. Number of Credit Hours (Total) / Number of Units (Total)
4/6

7. Course administrator's name (mention all, if more than one name)
Name: Dr. Laith Khalil Ibrahim Al-Taie Email: laith.altaie@uomosul.edu.iq

8. Course Objectives

Course Objectives	1. To develop problem solving skills and understanding of Engineering mechanics (static) throughout the context of this course. 2. To understand the principles of engineering mechanics I like vector and non-vector quantities, units conversion. 3. This course also deals with force systems and their result. 4. To understand the basics of equilibrium of objects. 5. To understand force distribution in trusses and frames. 6. To perform force analysis using the joint method and the section method. students are supposed to be familiar with the following points: 1. Understanding vector and non−vector quantities, units conversion. 2. Understanding force system and their resultant. 3. Understanding the equilibrium. 4. Understanding forces in trusses and frames.

9. Teaching and Learning Strategies

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

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	Principles of statics, 1- basic concepts, 2- vector and non-vector quantities, 3- Units and their conversion	General introduction on principles of engineering static.	Theoretical lectures in class	Exam

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

11. Course Evaluation

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

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	• Engineering mechanics – Static, Alanaz, H., Ministry of higher education, 1990.
Main references (sources)	• Engineering Mechanics: Statics & Dynamics, 2022, Russell C. Hibbeler
Recommended books and references (scientific journals, reports…)	--------------
Electronic References, Websites	--------------

Course Description Form

1. Course Name:
Engineering Drawing
2. Course Code:
DWRE 113
3. Semester / Year:
First/ 2024−2025
4. Description Preparation Date:
1/6/2023
5. Available Attendance Forms:
Experimental lectures in lab.
6. Number of Credit Hours (Total) / Number of Units (Total)
90 hours/ 6 ECTS credits
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Ahmed A. M. Al-Ogaidi, Email: a.alogaidi@uomosul.edu.iq Name: Ziyad Taher Ali, Email: ziyad.ali@uomosul.edu.iq Name: Ahmed A. Ahmed Email: ahmad.alkatan84@gmail.com
8. Course Objectives

Course Objectives	• To inform students about the importance of engineering drawing and the essential instruments. • To teach students different types of lines. • To teach students the basic geometrical constructions. • To introduce students to multi view drawing via theory of projection. • To teach students 3D drawing based on Isometric concept. • To imagine the complicated bodies by drawing sectional view.

9. Teaching and Learning Strategies

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

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

10. Course Structure

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

11. Course Evaluation

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

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	French, T.E., Vierck, C.J. and Hang, R.I., 1978. The Fundamentals of Engineering Drawing and Graphic Technology. McGraw-Hill.
Main references (sources)	• Morling, K., 2010. Geometric and Engineering Drawing 3E. Routledge. • Hanifan, R., 2014. Perfecting engineering and technical drawing: Reducing errors and misinterpretations (Vol. 139). Springer. Al-Khafaf, Abd Al-Rasul, Engineering Drawing, Technical University, Arabization and Publishing Centre, Baghdad, 1986.
Recommended books and references (scientific journals, reports…)	-------
Electronic References, Websites	https://www.coursera.org/search?query=engineering%20drawing

Course Description Form

1. Course Name:	
Introduction to Water Resources Engineering	
2. Course Code:	
DWRE 114	
3. Semester / Year:	
First/ 2024-2025	
4. Description Preparation Date:	
18/4/2024	
5. Available Attendance Forms:	
A theoretical lecture in the classroom	
6. Number of Credit Hours (Total) / Number of Units (Total)	
75 hours/ 3 ECTS credits	
7. Course administrator's name (mention all, if more than one name)	
Name: Abdulghani Khalaf Mohammed,　　Email: Alrobaai1982@uomosul.edu.iq	

8. Course Objectives

Course Objectives	• **Introducing students to the importance of water resources for human life and what is the primary role of the dams and water resources engineer in managing and developing these resources and ways to preserve them.** • **Introducing students to the basic principles of irrigation and drainage engineering, modern and ancient irrigation methods, and ways to preserve water wealth.** • **Introducing students to the basic principles of studying fluid flow in pipes and open channels and the most important methods used to measure and control it.** • **Introducing the student to the concept of the hydrological cycle, the movement of water above and below the surface of the earth, and the study of evaporation from the surface of the soil and the surface of free water and the effect of weather factors on it.**

9. Teaching and Learning Strategies

Strategy	**The main strategy that will be adopted in offering this course is to familiarize the student with the basic principles of the three branches (irrigation and drainage, hydraulics and hydrology) in the field of dams and water resources, to be an introduction that helps the student to delve deeper into the study of these disciplines in the next academic stages. At the same time, improving and expanding critical thinking skills, and introducing him to the importance of water resources in achieving a decent life for humanity. This is achieved through theoretical lectures, scientific reports, field visits, and interactive panel discussions.**

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	General introduction to the Department of Dams and Water Resources Engineering and the curriculum	A brief overview of the three branches of the Department of Water Dam Engineering	**Theoretical lecture in the classroom**	

2-5	12	An introductory introduction to the basic principles of hydrology	Phases of the hydrological cycle/ Irrigation water sources/ Floods/ Dams and reservoirs / Types of Water reservoirs/Types of dams /catchment area /Classification of dams/Water sources in Iraq/Control and storage projects/Executed large dams.	**Theoretical lecture in the classroom**	Quizzes in the fifth week
6-10	15	An introductory introduction to the basic principles of hydraulics	Hydraulic Structures/ Methods for measuring flow in open channels and pipes/Volumetric Measurements for discharge Measurement/ Velocity-Area Method for discharge Measurement/ Hydraulic Structures for discharge Measurement	**Theoretical lecture in the classroom**	Quizzes in the tenth week & Mid-course exam in the eighth week
11-15	15	An introductory introduction to the basic principles of irrigation and drainage	Irrigation projects in Iraq/Estimation of water consumption/Evapotranspiration/yield coefficient/Surface irrigation/sprinkler irrigation/ drip irrigation/Soil physical properties. Soil water forms/ Soil moisture content conventions/ Soil moisture content. irrigation efficiency/Water conduction efficiency/ water and consistency of distribution	**Theoretical lecture in the classroom**	Quizzes in the fifteenth week & Receiving scientific reports in the eleventh week

11. Course Evaluation

Evaluation type	Degree
3 quizzes	15
3 homework	15
1 Scientific report	10
Midterm exam	10
Final exam	50
Total	100

12. Learning and Teaching Resources

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

Course Description Form

1. Course Name:
hydrogeology

2. Course Code:
DWRE 117

3. Semester / Year:
1/2024‒2025

4. Description Preparation Date:
1/9/2023

5. Available Attendance Forms:
Theoretical lectures in class and on line

6. Number of Credit Hours (Total) / Number of Units (Total)
3/3

7. Course administrator's name (mention all, if more than one name)
Name: Ghada y. Abdullah   Email : g.alobaidy@uomosul.edu.iq   Name: Arwaa A.Jamal   Email :Arwa.abdalrazzaq@uomosul.edu.iq

8. Course Objectives

Course Objectives	5. To understand the types of Rocks and Engineering properties 6. Define hydrogeology and Hydrologic budget 7. Distinguish between Types of aquifers 8. This course deals with the basic concept of Geologic formations as aquifers. **9.** Calculate Porosity of rocks or soils in aquifers, groundwater movement, Permeability and Hydraulic Conductivity

9. Teaching and Learning Stragies

Strategy	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of exercises involving some problems that are interesting to the students in Soil, Rocks and the water move underground scope.

10. Course Structure

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

10	3	Introducing the student to the concept of water budget	Rock properties affecting groundwater	Theoretical lectures in class	Discuss reports
11	3	Knowing the types of rocks that have the ability to store water	Types of aquifers		H.W
12	3	Determine the porosity of rocks or soil in aquifers and the movement of groundwater.(iii)	Geologic formations as aquifers		H.W
13	3	Explain the basic concept of geological formations of aquifers. (i)	Porosity of rocks or soils in aquifers		H.W
14	3	Apply Darcy's equation to calculate hydraulic conductivity (iii)	groundwater movement		
15	3	Knowing the depth of groundwater in the layers of the earth	Permeability and Hydraulic Conductivity		

11. Course Evaluation

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

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	"STUDY GUIDE FOR A BEGINNIN-G COURSE IN GROUND-WATER HYDROLOGY" PART II. by O. Lehn Franke, Thomas E. Reilly, Ralph J.

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

Course Description Form

1. Course Name:
Computer

2. Course Code:
DWRE 116

3. Semester / Year:
First semester / 2024−2025

4. Description Preparation Date:
1/6/2023

5. Available Attendance Forms:
Theoretical & Experimental lectures in Computer lab.

6. Number of Credit Hours (Total) / Number of Units (Total)
75 hours/ 3 ECTS credits

7. Course administrator's name (mention all, if more than one name)
Name: Dr. Talal Ahmed Basheer Email: t.basheer@uomosul.edu.iq Name: Omar Kanaan Taha Email: omar.alsultan@uomosul.edu.iq

8. Course Objectives	
Course Objectives	The Module aim is to prepare student to deal with computers. In addition to, teach the student the fundamentals of computers and its components. Furthermore, learning how to use two of Microsoft Office applications (Word and Excel).

9. Teaching and Learning Strategies	
Strategy	The main strategy that will be adopted in delivering this module is to encourage students' participation in the Lab activities, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, laboratory and by considering type of external search involving some of computer technology that are interesting to the students.

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

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

11. Course Evaluation

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

12. Learning and Teaching Resources

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

Course Description Form

1. Course Name:
Mathematics II

2. Course Code:
DWRE 121

3. Semester / Year:
First/ 2024−2025

4. Description Preparation Date:	
1/6/2023	
5. Available Attendance Forms:	
Lectures in the classroom	
6. Number of Credit Hours (Total) / Number of Units (Total)	
93 hours/ 6 ECTS credits	
7. Course administrator's name (mention all, if more than one name)	
Name:Ahmed yahay Abdulhafedh, Email: ahmed.abdulhafedh@uomosul.edu.iq	
8. Course Objectives	

Course Objectives	Knowledge of the Transcendental Functions, Inverse Functions, Derivatives and integral of inv trigonometric functions, Exponential and logarithmic functions, Derivatives and integrals invol logarithmic and exponential functions, Graphs and applications involving logarithmic and expone functions, Hyperbolic functions, Hopital's Rule, An overview of integration methods: Trigonom substitutions, Trigonometric integral, Integration by parts, Integrating rational functions by partial fracti Numerical integration; Simpson's rule and Improper integrals.

9. Teaching and Learning Strategies

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

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	6	The student learns how to address transcendental functions	Transcendental Functions	A lecture in the classroom	HW and CW
2	6	The student learned how to derive and integrate inverse function equations	Inverse Functions	A lecture in the classroom	HW, CW, exam
3	6	The student learned how to solve integrals and inverse trigonometric functions	Derivatives and integral of inverse trigonometric functions	A lecture in the classroom	HW, CW, exam
4	6	The student learned to solve exponential and logarithmic functions	Exponential and logarithmic functions	A lecture in the classroom	HW, CW, exam
5-7	18	The student learned how to solve derivatives and integrals involving logarithmic and exponential functions	Derivatives and integrals involving logarithmic and exponential functions,	A lecture in the classroom	HW, CW, exam
8-9	12	The student learned how to draw applications and solutions of hyperbolic functions	Graphs and applications involving logarithmic and exponential functions, Hyperbolic functions	A lecture in the classroom	HW, CW, exam
10	6	The student learned how to solve limits using L'Hopital's rule	Hopital's Rule	A lecture in the classroom	HW, CW, exam

11-15	30	The student learned how to apply integrals that cannot be solved by direct application	An overview of integra methods: Trigonome substitutions, Trigonome integral, Integration by pa Integrating rational funct by partial fractions, Numer integration; Simpson's rule Improper integrals.	A lecture in the classroom	HW, CW, exam

11. Course Evaluation

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

12. Learning and Teaching Resources

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

Course Description Form

1. Course Name:
Engineering mechanics 2
2. Course Code:
DWRE 112
3. Semester / Year:
2024-2025
4. Description Preparation Date:
1/9/2023
5. Available Attendance Forms:
Theoretical lectures in class
6. Number of Credit Hours (Total) / Number of Units (Total)
4/6
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Laith Khalil Ibrahim Al-Taie Email: laith.altaie@uomosul.edu.iq

8. Course Objectives

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

9. Teaching and Learning Strategies

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

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	Friction	The nature of friction, mechanical friction, Coefficient of Friction, Friction issues	Theoretical lectures in class	Exam
2	4	Friction	wedges, Frictional forces in the belts	Theoretical lectures in class	HW & Exam
3	4	Centers and Centers of Gravity	The importance of centers, Centers of spaces and lines, Determination of centers by integration, Centers of compound shapes	Theoretical lectures in class	HW & Exam
4	4	Problem solving		Theoretical lectures in class	
5	4	**Moment of Inertia**	Units of measurement and signals, The moment of polar inertia, swirl radius, The equation for transferring the moment of inertia	Theoretical lectures in class	HW & Exam
6	4	**Moment of Inertia**	Moment of Inertia by Integration, The factorial of inertia, Maximum and minimum values of moment of inertia (Mohr circuit)	Theoretical lectures in class	HW & Exam
7	4	Problem solving		Theoretical lectures in class	
8	4	**introduction Kinematics of Particles**	**introduction Kinematics of Particles**	Theoretical lectures in class	HW & Exam
9	4	**introduction Kinematics of Particles**	Rectilinear motion	Theoretical lectures in class	HW & Exam
10	4	**introduction Kinematics of Particles**	Plane curvilinear motion	Theoretical lectures in class	HW & Exam
11	4	Circular motion	Circular motion	Theoretical lectures in class	HW & Exam
12	4	Dynamic friction	Dynamic friction	Theoretical lectures in class	HW & Exam
13	4	**Work and energy**	Equations, Work and energy applications	Theoretical lectures in class	HW & Exam

14	4	Power	Power and Efficiency	Theoretical lectures in class	HW & Exam
15	4	Problem solving		Theoretical lectures in class	HW & Exam
16	4	Preparatory week before the final Exam – review or open session for general questions	General Over review	Theoretical lectures in class	-

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

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Engineering mechanics – dynamic, Alanaz, H., Ministry of higher education, 1990.
Main references (sources)	• Engineering Mechanics: Statics & Dynamics, 2022, Russell C. Hibbeler
Recommended books and references (scientific journals, reports…)	--------------
Electronic References, Websites	--------------

Course Description Form

1. Course Name:
Computer Drawing
2. Course Code:
DWRE 123
3. Semester / Year:
Second semester / 2024−2025
4. Description Preparation Date:
1/9/2023
5. Available Attendance Forms:
Theoretical & Experimental lectures in lab.
6. Number of Credit Hours (Total) / Number of Units (Total)
150 hours/ 6 ECTS credits

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

Name: Dr. Talal Ahmed Basheer
Email: t.basheer@uomosul.edu.iq
Name: Omar Kanaan Taha
Email: omar.alsultan@uomosul.edu.iq

8. Course Objectives

Course Objectives	The module aims to shed light on how to use one of the most important computer aided drawing software - AutoCAD software - reviewing the most important information that the users need to utilize the most common program vision, to produce and extract 2D and 3D drawings. Qualifying students of the Dams and Water Resources Engineering Department to use the AutoCAD software to competently and efficiently realize engineering drawings, and assist them in implementing the details of the designs required in their projects.

9. Teaching and Learning Strategies

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

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	6	Learn the basics of coordinate systems & AutoCAD program	Introduction - AutoCAD program interface elements, Coordinate systems in the program, Drafting Settings: Grid, Snap, Ortho	A lecture in the lab	CW
2	6	Learn the AutoCAD drawing commands	Drawing commands: Line, Circle	A lecture in the lab	CW

3	6	Learn the AutoCAD drawing commands (Continued)	Drawing commands: Polygon, Rectangle	A lecture in the lab	CW & Exam
4	6	Learn the AutoCAD Modifying commands	Modify tools: Erase, Copy, Move	A lecture in the lab	CW
5	6	Learn the AutoCAD Modifying commands (Continued)	Modify tools: Mirror Rotate, Scale	A lecture in the lab	CW
6	6	Learn the AutoCAD assistant tools	Object Snap, View – Zoom, View - Pan	A lecture in the lab	CW
7	6	Learn the AutoCAD Modifying commands	Modify tools: Offset, Rectangular and Polar Array	A lecture in the lab	CW & HW
8	6	Learn the AutoCAD Modifying commands (Continued)	Modify tools: Stretch, Trim, Extend	A lecture in the lab	CW
9	6	Learn the AutoCAD drawing commands	Drawing Commands: Point, Divide, Hatch	A lecture in the lab	CW
10	6	Learn the AutoCAD drawing commands (Continued)	Drawing Commands: Text, Mtext	A lecture in the lab	CW & HW
11	6	Learn the AutoCAD Modifying commands	Modify tools: Chamfer, Fillet, Explode	A lecture in the lab	CW
12	6	Learning to use layers & drawing property	Layers and drawing element settings: Color, Linetype, Line Weight, Text Style	A lecture in the lab	CW & Exam
13	6	Learning to use dimensions	Dimensions and measurements	A lecture in the lab	CW
14	6	Learning how to print drawings	Printing and output	A lecture in the lab	CW

15	6	Learning the basic of three dimension drawing	Basics of 3D Drawings	A lecture in the lab	CW

11. Course Evaluation

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

12. Learning and Teaching Resources

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

Course Description Form

13. Course Name:
Engineering Statistics

14. Course Code:
DWRE124

15. Semester / Year:
2/2024-2025

16. Description Preparation Date:
1/9/2023

17. Available Attendance Forms:
Theoretical lectures in class

18. Number of Credit Hours (Total) / Number of Units (Total)
3/4

19. Course administrator's name (mention all, if more than one name)
Name: Dr. Saleh Mohammed Saleh   Email: s.zakaria@uomosul.edu.iq Name: Dr. Muhanad Talal Yousif   Email: mohanad_alsheer @uomosul.edu.iq

20.	Course Objectives

Course Objectives	The aim of this course is to introduce the students to the field of processes and practices of engineering statistics . Engineering statistics combines engineering and statistics using scientific methods to analyze data. This course will discuss some basic principles of engineering statistics, and introduces students to the fundamental concepts of Nature of statistical data and symbols, Viewing the data, Measures of central tendency, Measures of the mean, dispersion, and range. The average deviation, variance, coefficient of variation, binomial distribution, normal distribution, Principles of probability theory and hypothesis testing approach, Which is one of the most important topics in the field of making a decision to accept or reject the statistical hypothesis In addition to deal with the details of some statistical tests which include Chi square test, T-test and F-test, in addition to the Regression and correlation, the drawing method, the least squares method, the linear correlation.
	At the end of the course, students will have the necessary knowledge to conduct statistical analysis using statistical tests, determine the extent of data correlation, and have the ability to make a decision to accept or reject a statistical hypothesis, , and have the skills of analytical skills (analyze data collected in the field and examine the results) and Communication skills (prepare detailed reports that document their research methods and findings). This will be achieved through descriptive lectures with Preparing engineering statistics reporting and supervised tutorials.

21.	Teaching and Learning Strategies

Strategy	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises in addition lectures, individual & group assignments, and e-learning platforms, while at the same time refining and expanding their critical thinking skills. Exercises involving the use of statistical vocabulary and componentsto understand the engineering statistical processes. The course will be taught in Arabic , and all mandatory assignments have to be submitted within the deadlines to be admitted to the exams. This will be achieved through classes, interactive tutorials and by considering some challenging problems to motivate student

22. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Knowing the types and Nature of statistical data and symbols	Introduction, Nature of statistical data and symbols,	Theoretical lecture in class	HW
2	3	data analysis using table and drawing methods	Viewing the data, the table method, the drawing method.	Theoretical lecture in class	HW
3	3	Measures of central tendency and Knowing arithmetic mean, median, and mode	Measures of central tendency, the arithmetic mean, median, and mode	Theoretical lectures in class	Exam
4	3	Measures of the mean, dispersion, and range	Measures of the mean, dispersion, and range	Theoretical lectures in class	HW
5	3	Determination: average deviation, variance, coefficient of variation	The average deviation, variance, coefficient of variation	Theoretical lectures in class	Quizzes & HW

6	3	Knowing the Principles of probability theory	Principles of probability theory	Theoretical lectures in class	HW
7	3	Knowing the conditional probability	conditional probability.	Theoretical lectures in class	Midterm Exam
8	3	Analysis Statistical problems using Binomial distribution	Binomial distribution	Theoretical lectures in class	Assignment
9	3	Analysis Statistical problems using normal distribution	normal distribution.	Theoretical lectures in class	HW
10	3	Knowing the Hypothesis testing approach	Hypothesis testing approach.	Theoretical lectures in class	online Assignment
11	3	Analysis Statistical problems using Z- test	Statistical tests , Z- test.	Theoretical lectures in class	HW
12	3	Analysis Statistical problems using Chi square - test.	Chi square test .	Theoretical lectures in class	Report
13	3	Analysis Statistical problems using F-test .	F-test .	Theoretical lectures in class	HW
14	3	Analysis Statistical problems using Regression and correlation	Regression and correlation .	Theoretical lectures in class	HW
15	3	Analysis Statistical problems using least squares method , the linear correlation	the drawing method, the least squares method , the linear correlation.	Theoretical lectures in class	HM

23. Course Evaluation

Evaluation type	Degree
Quizzes	10
Assignment (HW) (each 1 pt)	10
online Assignment (classwork)	5
Report	10
Midterm Exam	15
Final Exam	50
Total	100

24. Learning and Teaching Resources

Required textbooks (curricular books, if any)	• Introduction to Statistics, Dr. Khasha Mahmoud Al-Rawi, College of Agriculture and Forestry, University of Mosul, 2nd Edition, 2000..
Main references (sources)	• An Introduction to the Science of Statistics: From Theory to Implementation, Preliminary Edition, Joseph C. Watkins
Recommended books and references (scientific journals, reports…)	--------------
Electronic References, Websites	--------------

Course Description Form

1. Course Name:
Water quality and pollution
2. Course Code:
DWRE 125
3. Semester / Year:
2/2024-2025
4. Description Preparation Date:
1/9/2023
5. Available Attendance Forms:
Theoretical lectures in class and labrotory
6. Number of Credit Hours (Total) / Number of Units (Total)
3/3
7. Course administrator's name (mention all, if more than one name)

Name: Dr. Omar Muqdad Abdulgany   Email: O.agha@uomosul.edu.iq
 Name: alaa ismaeil naser   Email:. alaa @uomosul.edu.iq
Name:arwa abd alrazzaq jamal.   Email: arwa.abdalrazzaq@uomosul.edu.iq

8. Course Objectives

Course Objectives	The aims of this topic 1. To gain an understanding of the environment and the different types of environmental pollution. 2. To understand the quantitative and qualitative distribution of water in the world and the hydrological cycle of water from a quantity perspective. 3. To learn about the properties of water sources and how they can become polluted. 4. To understand the impact of engineering projects on water quality and self-purification. 5. To study the effect of decomposition rate (decomposition constant) on the amount of oxygen required in the process of waste decomposition. 6. To analyze the effect of the quality and quantity of wastewater entering and leaving a lake. 7. To study the deficit of oxygen in the water and the processes of reaeration and deoxygenation. 8. To investigate the effect of wastewater on rivers and the different types of pollution that can occur. 9. To understand the impact of detergents on water pollution.

| | | 10. To study the different types of pollution that can affect rivers and their ecosystems. |

9. Teaching and Learning Strategies

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

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Understand what the water cycle in nature means (i)	Introduction to Environment Lab 1: Solids, Dissolved and Suspended solids, and total solids	Theoretical lectures and labrotory	
2	3	Understand what the water cycle in nature means (i)	Hydrological Cycle of water from quantity sides. Lab 1: Solids, Dissolved and Suspended solids, and total solids	Theoretical lectures and labrotory	H.W + practical experience report
3	3	Identify the main sources of water pollution and the different types of pollutants. (i)	Properties of water sources, how water sources polluted. Lab 2: Turbidity	Theoretical lectures and labrotory	practical experience report

		Knowing the limits at which water is classified as suitable for drinking or not (iii)			
4	3	Project management and solutions (iii)	Effect of engineering project on water quality and self-purification. Lab 2: Turbidity	Theoretical lectures and labrotory	practical experience report
5-6	3	Identify the reasons for non-organic decomposition and organic decomposition with oxygen and calculate the decomposition constant (i) The student learns to use pH meters and know the acidity and basicity of water (iii)	Effect of decomposition rate (decomposition constant) on the amount of oxygen required in the process of waste decomposition Lab 3: PH-value Electrical Conductivity.	Theoretical lectures and labrotory	Daily exam + practical experience report
7	3	To be able to calculate changes in dissolved oxygen, anoxia, and biological oxygen demand (BoD) along a river course due to wastewater. (iii)	Calculate the change of dissolved oxygen along the riverbed due to wastewater. Lab 3: PH-value& Electrical Conductivity.	Theoretical lectures and labrotory	practical experience report
8	3		Mid-term Exam Lab 4: Electrical onductivity	Theoretical lectures and labrotory	Monthly exam

9	3	To be able to calculate changes in dissolved oxygen, anoxia, and biological oxygen demand (BoD) along a river course due to wastewater. (iii) Knowing the salt concentration of water through a salinity measuring device (iii)	Calculate the change of deficit oxygen along the riverbed due to wastewater. Lab 4: Electrical Conductivity	Theoretical lectures and labrotory	practical experience report
10	3	To be able to calculate changes in dissolved oxygen, anoxia, and biological oxygen demand (BoD) along a river course due to wastewater. (iii)	Calculate the change of BoD along the riverbed due to wastewater Lab 5: Hardness	Theoretical lectures and labrotory	Daily exam Practical experience report
11-12	3	Be able to calculate the impact of the quality and quantity of wastewater entering and leaving the lake.(i) Learn water hardness limits and calcium and sodium	Effect of the quality and quantity of wastewater entering and leaving the lake. Lab 5: Hardness	Theoretical lectures and labrotory	H.W Practical experience report

		concentrations (iii)			
13	3	Be able to calculate the impact of the quality and quantity of wastewater entering and leaving the lake.(i)	Seasonal inversion in lakes, Effect of detergents on the pollution of the water Lab 6: Dissolved Oxygen	Theoretical lectures and labrotory	Practical experience report
14	3	Gain experience and understand the types of pollution and ways to treat them (iii) Knowing the extent of the effect of low oxygen on aquatic organisms (iii)	Study the type of pollution on the river. Lab 6: Dissolved Oxygen	Theoretical lectures and labrotory	Practical experience report
15	3	Identifying the causes of pollution and finding appropriate solutions to solve the pollution problem (iii)	Wastewater treatment.	Theoretical lectures and labrotory	Practical experience report
16	3	Preparatory week before the final Exam			

11. Course Evaluation

Evaluation type	Degree
quizzes 2	10
Homework 2	10
Report 1	5
Project labrotory 1	15
Term exam	10

Final exam	50
Total	100

12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	• د. طارق احمد محمود " علم و تكنولوجيا البيئة " كتاب منهجي لمادة هندسة البيئة – جامعة الموصل –كلية الهندسة.
Main references (sources)	•
Recommended books and references (scientific journals, reports…)	--------------
Electronic References, Websites	--------------

Course Description Form

13.Course Name:
Human Rights and Democracy

14.Course Code:
DWRE126

15.Semester / Year:
2/2023 – 2024

16.Description Preparation Date:
2023/9/1

17.Available Attendance Forms:
My presence

18.Number of Credit Hours (Total) / Number of Units (Total)
2/2

19.Course administrator's name (mention all, if more than one name)
Name: sarah ahmed hamad Sarah_law @uomosul.edu.iq

20.Course Objectives
-Understanding, knowing, a realizing the rights that God Almigl has granted to all human beings. Th are a gift, not a gain for anyone, a no one has the right to take th away.

- The student expresses and defer these rights in his own way - Explaining phenomena and givi explanations for the violations rights that occur before him - Identifying deficiencies and gaps light of the information available the course	

21.Teaching and Learning Strategies	

Strategy	- In-person education, through which the following teaching methods were used:
	- lecture
	- Discussion
	- Brainstorming
	- Problem Solving
	- Assigning the student to prepare a report
	- In addition to e-learning support, which was done through classroom
	    • Homework
	    •

22. Course Structure

Evaluation method	Learning method	Name of the unit or topic	Required learning outcomes	hours	week
	Theoretical leacture	Introduction/The concept of human rights	The student should know an introduction to rights(v)	2	1
	Theoretical leacture	Definition of right	The student must know the correct language and terminology (v)	2	2
	Theoretical leacture	Definition of human	The student should know the definition of a human being(v)	2	3

Daily exam + H.W	Theoretical leacture	Legal personality and its features	That the student understands the concept of legal personality and its feature(iv)	2	4
	Theoretical leacture	Historical development of the concept of rights and freedoms	The student should enumerate the historical development of rights and freedoms(v)	2	5
	Theoretical leacture	Rights and freedoms in Eastern civilizations	The student should know Eastern civilizations(iv)	2	6
	Theoretical leacture	Rights and freedoms in Eastern civilizations	The student should know Western civilizations(v)	2	7
Mid exam	Theoretical leacture	The historical development of the idea of rights in the ages	The student should know the rights of the ages(v)	2	8
	Theoretical leacture	Rights and freedoms in heavenly laws	The student should enumerate the heavenly laws(v)	2	9
	Theoretical leacture	Rights and freedoms in the Christian religion	The student should know the rights in the Christian religion(v)	2	10
Daily exam	Theoretical leacture	Rights and freedoms in the Islamic religion	That the student understands the rights and freedoms in the Islamic religion(iv)	2	11

				2	12
H.W	Theoretical leacture	Development in the concept of human rights throughout the modern era	To talk about human rights throughout the modern era(v)	2	12
	Theoretical leacture	Review and discuss		2	13
	Theoretical leacture	Modern trends in rights a freedoms	The student sho enumerate modern trends rights and freedon (v)	2	14
Discuse	Theoretical leacture	Discusse report		2	15

23.Course Evaluation
very good

24.Learning and Teaching Resources	
Evaluation type	**Degree**
2 quizzes(2)	20
Report(1)	10
H.w(2)	10
Mid exam 1	10
Final exam	50
Total	100
Required textbooks (curricu books, if any)	computer
Main references (sources)	Curriculum
Recommended books and references (scientific journals, reports...)	https://classroom.google.com/c/NjM4NDkzMTgyNjk4?cjc=dlbklgw
Electronic References, Websites	Google scholar Youtube

Course Description Form

1. Course Name:	
English Language I	
2. Course Code:	
DWRE 126	
3. Semester / Year:	
2/2024−2025	
4. Description Preparation Date:	
1/9/2023	
5. Available Attendance Forms:	
Theoretical lectures in class	
6. Number of Credit Hours (Total) / Number of Units (Total)	
2/2	
7. Course administrator's name (mention all, if more than one name)	
Name: Dr. Saleh Mohammed Saleh Email: s.zakaria@uomosul.edu.iq	

8. Course Objectives

Course Objectives	1. The main objective of this course is to emphasize the fundamental language skills of reading, writing, speaking, listening, thinking, viewing, and presenting. 2. The course includes studies of various literary genres: short story, novel, and non-fiction. 3. The course also helps students to improve their English language grammar and reading abilities, and becoming more effective use of grammar and natural self-expression in English.

9. Teaching and Learning Strategies

Strategy	The primary strategy for delivering this module will be to encourage students to participate in the exercises while refining and expanding their critical thinking skills. This will be accomplished through classes, interactive tutorials, and the consideration of simple experiments involving sampling activities that students find interesting.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	The students will attain and enhance competence in the four modes of literacy: writing, speaking, reading and listening.	Unite 1 : A world of difference: Tenses * Auxiliary verbs * What's in a word? Everyday situations	Theoretical lecture in class	HW
2	2	Students will heighten their awareness of correct usage of English	Starter : Tenses and auxiliary verbs, Each question has one word missing. Write it in, T 1.1	Theoretical lecture in class	HW

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

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

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

11. Course Evaluation

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

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	• Ronald Carter and Michael McCarthy. Cambridge grammar of English: A comprehensive guide. Cambridge: Cambridge University Press, 2006.
Main references (sources)	• Rodney Huddleston, Geoffrey K. Pullum. The Cambridge Grammar of the English Language, 2002.
Recommended books and references (scientific journals, reports…)	--------------
Electronic References, Websites	--------------

Second Level

Semester 3

Semester	No.	Module Code	Module Name in English	USSWL hr/sem	SWL hr/sem	ECTS	Module Type	Prerequisite Module(s) Code
3	1	DWRE 211	Mathematics III	62	125	5.00	B	
	2	DWRE 212	Fluid Mechanics I	57	150	6.00	C	
	3	DWRE 213	Strength of Materials	72	150	6.00	B	
	4	DWRE 214	Surveying I	22	100	4.00	C	
	5	UOM 2032	Computer II	27	75	3.00	B	
	6	DWRE 216	Building Construction	37	100	4.00	C	
	7	UOM 2012	Arabic 2	17	50	2.00	B	
				294	750	30.00		

Semester 4

Semester	No.	Module Code	Module Name in English	USSWL hr/sem	SWL hr/sem	ECTS	Module Type	Prerequisite Module(s) Code
4	1	DWRE 221	Engineering Analysis	62	125	5.00	B	
	2	DWRE 222	Fluid Mechanics II	47	125	5.00	C	DWRE 212
	3	DWRE 223	Structures	72	150	6.00	B	
	4	DWRE 224	Surveying II	22	100	4.00	C	
	5	DWRE 225	Soil Physics	57	150	6.00	C	
	6	UOM 2022	English 2	17	50	2.00	B	
	7	UOM 2050	Baath Crimes in Iraq	17	50	2.00	B	
				294	750	30.00		

Module Information
معلومات المادة الدراسية

			Module Delivery	
Module Title	**Mathematics III**			
Module Type	**Basic**		☐ **Theory**	
Module Code	**DWRE 211**		☒ **Lecture** ☐ **Lab**	
ECTS Credits	**5**		☒ **Tutorial** ☐ **Practical**	
SWL (hr/sem)	**125**		☐ **Seminar**	
Module Level	2	**Semester of Delivery**		1
Administering Department	Dams and Water Recourses	**College**	Engineering	
Module Leader	Muhanad Talal Yousif	**e-mail**	Mohanad_ALsheer@uomosul.edu.iq	
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)	**e-mail**	E-mail	
Peer Reviewer Name	Dr. Omer	**e-mail**	o.agha@uomosul.edu.iq	
Scientific Committee Approval Date	20/8/2024	**Version Number**	1.0	

Relation with other Modules
العلاقة مع المواد الدراسية الأخرى

Prerequisite module	Mathematics II (DWRE 121)	**Semester**	Spring
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	1. To develop problem solving skills and understanding of Polar coordinates system and its applications. 2. To understand Vectors and Geometry of Space, Scalar Product, Cross Product 3. This course deals with the basic concept of Partial Differentiation. 4. To understand Double Integrals and its applications. 5. To perform Infinite Sequences and Series analysis.

Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Discrimination between Polar coordinates system and cartesian coordinates system. 2. Learn how to calculate the area and curve length in Polar coordinates system. 3. Describe the vector components and the products between two vectors. 4. Identify Partial Differentiation and Second – Order Partial Differentiation. 5. Explanation the double integral. 6. Define the Infinite Sequences and Series.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Polar coordinates system, Graphing in polar coordinates system, Area in polar coordinates system, Curve length in polar coordinates system. [16 hrs] Vectors and Geometry of Space, Space coordinate and space vector, Scalar Product (Dot Product) and Applications (line equation in the plane), Cross Product (Vector Product) and Applications (the distance from appoint to a line in space) . [24 hrs] Partial Differentiation, Second – Order Partial Differentiation, The chain rule for partial derivatives. [24 hrs] Double Integrals and its applications, The methods of least squares, Infinite Sequences and Series. [24 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of exercises involving some problems that are interesting to the students in mathematics scope.

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

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	3	15% (15)	2, 6, 12	LO #1, 2
	Assignments	5	10% (10)	1, 4, 7,11, 14	LO #1, 2
	Report	1	10% (10)	13	LO #1, 2
	seminars	1	5% (5)	10	LO #1, 2
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1,2
	Final Exam	3hr	50% (50)	16	LO # 1,2
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Polar coordinates system, Graphing in polar coordinates system
Week 2	Area in polar coordinates system, Curve length in polar coordinates system
Week 3	Vectors and Geometry of Space, Space coordinate and space vector
Week 4	Scalar Product (Dot Product) and Applications (line equation in the plane)
Week 5	Cross Product (Vector Product) and Applications (the distance from appoint to a line in space)
Week 6	Plane Equation in space, Angles between planes
Week 7	Partial Differentiation, exercises
Week 8	Second – Order Partial Differentiation, exercises
Week 9	The chain rule for partial derivatives
Week 10	Directional Derivatives in the plane
Week 11	Tangent plane and normal line of surface
Week 12	Extreme (Maxima and Minima) values and Saddle points.
Week 13	Double Integrals and its applications
Week 14	The methods of least squares
Week 15	Infinite Sequences and Series
Week 16	**Preparatory week before the final Exam**

<table>
<tr><th colspan="3" align="center">**Learning and Teaching Resources**
مصادر التعلم والتدريس</th></tr>
<tr><td></td><td align="center">**Text**</td><td align="center">**Available in the Library?**</td></tr>
<tr><td>**Required Texts**</td><td>"Calculus". Ross L Finney and George B. Thomas. Copyright by Addison Wesley Publishing Company, 1990.</td><td align="center">Yes</td></tr>
<tr><td>**Recommended Texts**</td><td>"THOMAS CALCULUS" George B. Thomas. Printed in the United States of America., 2014.</td><td align="center">No</td></tr>
<tr><td>**Websites**</td><td></td><td></td></tr>
</table>

Group	Grade	التقدير	Marks (%)	Definition

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 Information

معلومات المادة الدراسية

Module Title	**Fluid Mechanics 1**		Module Delivery	
Module Type	<u>**Core**</u>		☒ **Theory**	
Module Code	DWRE 212		☒ **Lecture**	
ECTS Credits	<u>**6**</u>		☒ **Lab**	
SWL (hr/sem)	**150**		☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	

Module Level	2	Semester of Delivery		1
Administering Department	Type Dept. Code	**College**	Type College Code	
Module Leader	Azza Nasralla Jaralla Al-talib	**e-mail**	a.altalib@uomosul.edu.iq	
Module Leader's Acad. Title	Asst. Prof.	**Module Leader's Qualification**		M.Sc.
Module Tutor	arwa abdalrazaq	**e-mail**	E-mail	
Peer Reviewer Name	ahmed younis	**e-mail**	E-mail	
Scientific Committee Approval Date	20/08/2024	**Version Number**	1.0	

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	The fluid mechanics is the basic subject for second-stage students in the dams and water resources engineering department that from this subject student will learn and practice to fluid properties (units and dimensions, Density, Specific weight. Viscosity, Surface tension, Capillarity. Fluid static (pressure–density–height relationships). Absolute pressure and gage pressure, types of pressure gages. Force on submerged plane surfaces. Force on submerged curved surfaces. Applied problem about gates, dams ………etc. Stability of submerged and floating bodies. This achieved by theoretical lecturers.

Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. learn and practice to fluid properties. 2. learn the fundamental of pressure, (atmosphere, absolute and gauge) pressure. 3. Determine pressure in static fluid on vertical inclined and curved gates. 4. Determine stability of floating bodies and center of pressure.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Introduction, Fluid properties – Units and Dimensions, Density, Specific weight, [15 hrs] Compressibility, Elasticity. Viscosity, Surface tension, Capillarity. [15 hrs] Fluid static (pressure–density–height relationships). [15 hrs] Absolute pressure and gage pressure,. types of pressure gages. [15 hrs] Force on submerged plane surfaces, Force on submerged curved surfaces, Applied problem about gates, dams ………etc. [15 hrs] Stability of submerged and floating bodies, [10 hrs] Application on Stability of submerged and floating bodies. [10 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	57	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction
Week 2	Fluid properties – Units and Dimensions, Density, Specific weight,
Week 3	Compressibility, Elasticity. Viscosity, Surface tension, Capillarity
Week 4	Fluid static (pressure–density–height relationships).
Week 5	Fluid static (pressure–density–height relationships).
Week 6	Absolute pressure and gage pressure,. types of pressure gages
Week 7	Mid-term Exam
Week 8	Force on submerged plane surfaces.
Week 9	Force on submerged curved surfaces
Week 10	Applied problem about gates, dams ………etc.

Week 11	Applied problem about gates, dams ………etc.
Week 12	Stability of submerged and floating bodies.
Week 13	Applied problems on Stability of submerged and floating bodies
Week 14	Applied problems on Stability of submerged and floating bodies
Week 15	Applied problems on Stability of submerged and floating bodies
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)
المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1:Center of Pressure of Immersed Surface
Week 2	Lab 2:Bernoulli's equation
Week 3	Lab 3:Forces due to Jet Impact on Plates
Week 4	Lab 4:Reynolds Number in Pipe
Week 5	Lab 5: Reynolds Number in Pipe
Week 6	Lab 6: Flow Through Orifices
Week 7	Lab 7: Flow Through Orifices

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Elementary fluid mechanics By: Vinnard 6th ed. 1981	Yes
Recommended Texts	fluid mechanics by MERLE C. POTTER, DAVID C. WIGGERT 2008	No
Websites	https://www.coursera.org/browse/physical-science-and-engineering/fluid-mechanics	

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 Information
معلومات المادة الدراسية

Module Title	**Strength of Materials**		**Module Delivery**	
Module Type	**B**		☒ Theory ☒ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Code	**DWRE 213**			
ECTS Credits	**6**			
SWL (hr/sem)	**150**			
Module Level	2	**Semester of Delivery**		1
Administering Department	Dam and water resources	**College**	Engineering	
Module Leader	Dr. Saddam M AHMED	**e-mail**	Ahmed.saddam@uomosul.edu.iq	
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	Ph.D.	
Module Tutor	Nil	**e-mail**	Nil	
Peer Reviewer Name	Anmar A.M. Al-Talib	**e-mail**	Anmar.altalib@uomosul.edu.iq	
Scientific Committee Approval Date	10/09/2024	**Version Number**	1.0	

Relation with other Modules
العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

	Module Aims, Learning Outcomes and Indicative Contents
	أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية
Module Aims أهداف المادة الدراسية	In DARE 213, initially students will learn six key fundamental learning outcomes planed within this course to enhance students understanding to the following aspects: i. **Behavior of axially loaded bars and trusses.** ii. **Deformation and strain in cables and analysis indeterminate system.** iii. **Stresses under bending, shear, torsion and combination actions.** iv. **Internal shear and moment within the system.** v. **Deformation in beam systems.** vi. **Stresses in micro-elements.**
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon successful completion of this course the student shall be able to: 1. Assess the behavior of axially loaded bars and trusses, (i) 2. Design axially loaded bars and trusses, (i) 3. Assess the behavior of element under bending action, (iii) 4. Assess the shear stresses and design the connections and bolts, (ii) 5. Assess the shear stresses, deformation and design of system due to torsion, (ii) 6. Assess deformation and strain for cables and analysis indeterminate system, (iii) 7. Assess mechanical properties of beams and can evaluate the max shear and bending moment in the system, (iv) 8. Evaluate the stress distortion due to combination action of force and bending, (iii) 9. Assess the maximum deformation and slope with the system, (v) 10. Evaluate principal stresses and maximum in-plane shear stress using Mohr's circle–plane stress, absolute maximum shear stress, plane strain, (vi)

Indicative Contents المحتويات الإرشادية	An introduction to Strength of Materials, General Principles, Units of Measurement, Numerical Calculations **[2hrs]**, Conditions for Rigid-Body Equilibrium **[1hrs]**, Structural Analysis **[2hrs]**. Normal Stress in an Axially Loaded Bar, Internal Resultant Loadings **[2hrs]**, Shear strength in supports, Design of pinned supports **[3hrs]**. Simple Truss stresses **[2hrs]**, Allowable Stress in truss members, design of truss members **[3hrs]**. Design of Simple Connections **[2hrs]**, Bolts connections, design of connection-plates **[3hrs]**. Deformation, Strain, Hooke's Law**[2hrs]**, Strain Energy, Elastic Deformation of an Axially Loaded Member **[3hrs]**. Statically Indeterminate Analysis of system using additional Strain Relations **[5hrs]**. Torsion, Torsional Deformation of a Circular Shaft, Torsion Formula **[2hrs]**, Power Transmission**[1hrs]**, Angle of Twist, Statically Indeterminate Torque-Loaded Members **[2hrs]**. Bending, Shear and Moment Diagrams **[5hrs]**. Member Graphical Method for Constructing Shear and Moment Diagrams**[5hrs]**. Bending Deformation of a Straight Member **[1hrs]**, Flexure Formula, Shear Formula **[2hrs]**. Deflection of Beams **[2hrs]**. State of Stress Caused by Combined Loadings (force and bending) **[5hrs]** The Elastic Curve **[1hrs]**, Slope and Displacement by Integration **[4hrs]**. Slope and Displacement using Discontinuity Functions**[3hrs]**, Method of Superposition **[2hrs]**. General Equations of Plane-Stress Transformation**[2hrs]**, Principal Stresses and Maximum In-Plane Shear Stress**[3hrs]**. Mohr's Circle–Plane Stress**[2hrs]**, Absolute Maximum Shear Stress**[1hrs]**, Angular Stress Transmission**[2hrs]**.

Learning and Teaching Strategies

	استراتيجيات التعلم والتعليم	
Strategies	Power point presentation and multimedia tools are used in classrooms; Examples and problems will be solved and illustrated on the classroom board; Tutorials are also organized to establish a closer contact with students. Students are encouraged to use the Internet to search for various topics, including contents of similar courses offered elsewhere. MS Excel software is used for preparing projects. Students can reach the teaching material, solved problems, data sheets, past exam papers etc. on the allocated Web site. The instructor will be happy to answer questions related to course content via email. Complex technical questions should be addressed in tutorial, during office hours, or by appointment. Emails must come from official University email addresses. The instructor will not respond to outside email addresses.	

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	5.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation

تقييم المادة الدراسية

		Time /Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	14% (14)	3, 9	LO #4 and #7
	Assignments	8	16% (16)	2,4,6,8,10,11, 12,14	LO # (1-2), # (3-4), # 5- to - # 10
	Projects / Lab.	-	-	-	-
	Report	2	10% (10)	4,12	LO # 5 and #7
Summative assessment	Midterm Exam	2hr	10% (10)	7	LO # 1-6
	Final Exam	3hr	50% (50)	16	LO # 1-10
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	An introduction to Strength of Materials, General Principles, Units of Measurement, Numerical Calculations, Conditions for Rigid-Body Equilibrium, Structural Analysis.
Week 2	Normal Stress in an Axially Loaded Bar, Internal Resultant Loadings, Shear strength in supports, Design of pinned supports.
Week 3	Simple Truss stresses, Allowable Stress in truss members, design of truss members.
Week 4	Design of Simple Connections, Bolts connections, design of connection-plates.
Week 5	Deformation, Strain, Hooke's Law, Strain Energy, Elastic Deformation of an Axially Loaded Member.
Week 6	Statically Indeterminate Analysis of system using additional Strain Relations.
Week 7	Torsion, Torsional Deformation of a Circular Shaft, Torsion Formula, Power Transmission, Angle of Twist, Statically Indeterminate Torque-Loaded Members.
Week 8	Bending, Shear and Moment Diagrams.
Week 9	Member Graphical Method for Constructing Shear and Moment Diagrams.
Week 10	Bending Deformation of a Straight Member, Flexure Formula, Shear Formula. Deflection of Beams.
Week 11	State of Stress Caused by Combined Loadings (force and bending)
Week 12	The Elastic Curve, Slope and Displacement by Integration.
Week 13	Slope and Displacement using Discontinuity Functions, Method of Superposition.
Week 14	General Equations of Plane-Stress Transformation, Principal Stresses and Maximum In-Plane Shear Stress.
Week 15	Mohr's Circle–Plane Stress, Absolute Maximum Shear Stress, Angular Stress Transmission.
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	o F. Singer & A. Pytel, D.I.T. "Strength of Materials". Harper & Row publisher, 2003. NewYork, USA.	Yes
Recommended Texts	o R C., HIBBELER (2011) "Mechanics of Materials", eight Edition, PEARSON, ISBN 13: 978-0-13-602230-5, USA. (can be downloaded from the Course web page).	yes
Websites	Google Classroom	

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 Information				
معلومات المادة الدراسية				
Module Title	**Surveying I**		**Module Delivery**	
Module Type	**Core**		☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	DWRE 214			
ECTS Credits	**4**			
SWL (hr/sem)	**100**			
Module Level	2	**Semester of Delivery**		1
Administering Department	DWRE 214	**College**	Engineering	
Module Leader	Dr. Omar Muqdad Abdulgany	**e-mail**	O.agha@uomosul.edu.iq	
Module Leader's Acad. Title	Asst.Prof.	**Module Leader's Qualification**	Ph.D.	
Module Tutor	Alaa A. Nasar	**e-mail**	E-mail	
Peer Reviewer Name		**e-mail**	E-mail	
Scientific Committee Approval Date	20/08/2024	**Version Number**	1.0	

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	Surveying I aims to teach students how to measure distances through obstacles, construction and adjustment of levels, Measurement a long straight line offset, Methods of locating a point or the types of coordinates, Systematic or accumulation errors for tape, Reciprocal leveling, Determine Contour Interval and Contour Line Values, determine the level of the sewer, and computation of area (regular and irregular figures) by using different methods.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	After studying this course, the students should be able to: 1- To understand different types of survey. 2- To understand plane surveying instruments such as: tapes, levels. 3- To choose appropriate equipment for specific survey measurements. . 4-Interpret the disclosure and balancing in measurements. 5-To calculate areas using different methods 8- Contour mapping using different methods. 9- To determine the level of the sewer
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A: Surveying by tape Surveying by tape: Measurement a long straight line, Measurement a long straight line offset, How to draw a perpendicular on survey line when the point is on the line, How to draw a perpendicular from point out of the straight line, By cross staff, Optical square . Methods of locating a point or the types of coordinates, Rectangular coordinates, Focal coordinates, Angular coordinate, Polar coordinates [15 hrs] Systematic or accumulation errors: Correction of tape for standardization, Correction for slope, Correction for temperature, Correction for sag, Correction for pull or tension . [6 hrs] Obstacles : Those which can be measured a cross but cannot be seen a cross, Those which can be seen a cross but cannot be measured a cross, Those can neither be seen a cross nor be measured a cross. [12 hrs]

	Part B - Levelling
	Levelling : Level, Horizontal surface, Horizontal line, Bench mark (B.M) , Simple levelling, Procedure in levelling, Rise and fall method, Height of collimation method [15 hrs]
	Cross-sections , contouring, Gridding or (The methods of squares), Radiating lines, Direct contouring [6 hrs]
	Reciprocal leveling, Curvature and Refraction, [6 hrs] Sewer [6hrs] Areas , Mechanical integration – the planimeter, Areas enclosed by straight lines , and Irregular figures [9hrs]

Learning and Teaching Strategies	
استراتيجيات التعلم والتعليم	
Strategies	Learning and teaching strategies in surveying will be designed to engage students in the subject matter while equipping them with the necessary knowledge and skills. These will be encouraged students to participate in the learning process through activities that require them to apply their knowledge. This can be accomplished through problem-solving exercises, case studies, and fieldwork. Also, encourage students to work in groups to solve problems and complete projects. This approach promotes teamwork, communication, and critical thinking skills. Fieldwork will be Provided opportunities for students to engage in real-world surveying activities. This could involve conducting surveys, collecting data, and analyzing the results in the field.

Student Workload (SWL)			
الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	22	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 8,9 and 10
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	15% (15)	Continuous	All
	Report	7	5% (5)	3,4,5,6,7,9,10	LO # 2, 3,4, 6,10 and 10
Summative assessment	**Midterm Exam**	2 hr	10% (10)	8	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction - Surveying by tape
Week 2	Methods of locating a point or the types of coordinates, Quiz No.1
Week 3	Systematic or accumulation errors
Week 4	Systematic or accumulation errors: Correction for sag, Correction for pull or tension
Week 5	Obstacles
Week 6	Levelling, Projection of building
Week 7	Mid-term Exam
Week 8	Procedure in levelling, Rise and fall method,
Week 9	Height of collimation method
Week 10	Cross-sections, Quiz No.2
Week 11	contouring, Gridding or (The methods of squares), Radiating lines, Direct contouring
Week 12	Reciprocal leveling,
Week 13	Curvature and Refraction, Sewer
Week 14	Sewer
Week 15	Areas , Mechanical integration – the planimeter, Areas enclosed by straight lines , and Irregular figures
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus)
المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Create a straight line using tape
Week 2	Lab 2: Layout a building on graph paper
Week 3	Lab 3: cross section
Week 4	Lab 4: Level
Week 5	Lab 5: Profile levelling
Week 6	Lab 6: fly levelling
Week 7	Lab 7: cross section

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Surveying (A.Bannister & S.Raymond)	Yes
Recommended Texts	Surveying by (S.K.Hussin and M.SNagaraj)	No
Websites		

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 Information
معلومات المادة الدراسية

Module Title	<u>**Computer II**</u>		**Module Delivery**
Module Type	<u>**Basic**</u>		☒ Theory
Module Code	<u>**UOM 2032**</u>		☐ Lecture
			☒ Lab
ECTS Credits	<u>**3**</u>		☐ Tutorial
			☐ Practical
SWL (hr/sem)	<u>**75**</u>		☐ Seminar

Module Level	2	**Semester of Delivery**	1
Administering Department	Dam and Water Resources Engineering (DWRE)	**College**	College of Engineering
Module Leader	OMAR KANAAN TAHA	**e-mail**	omar.alsultan@uomosul.edu.iq
Module Leader's Acad. Title	Ass.Lecturer	**Module Leader's Qualification**	MSc
Module Tutor	Mohamed Abdulstar Jabur	**e-mail**	mohamed.abdulstar@uomosul.edu.iq
Peer Reviewer Name	Dr. Talal Ahmed Basheer	**e-mail**	t.basheer@uomosul.edu.iq
Scientific Committee Approval Date		**Version Number**	1.0

Relation with other Modules
العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	The Module aim is to prepare student to deal with computers. In addition to, teach the student the fundamentals of computers and its components. Furthermore, learning how to use two of Microsoft Office applications (Word and Excel).

Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Students successfully completing this course will be able to: 1. Identify and discuss the hardware components of the computer system. 2. Create documents using a word processor and create presentations. 3. Conduct research on the Internet. 4. Gain an introduction to Artificial Intelligence.
Indicative Contents المحتويات الإرشادية	**Security and Networking** [4 hr] **E-Commerce** [4 hr] **Computer Troubleshooting** [8 hr] **Introduction to AI** [8 hr] **AI in Our Daily** [8 hr] **Applications of AI** [12 hr] **AI and Society** [4 hr] **Ethical Challenges in AI** [4 hr] **The Future of AI** [4 hr]

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	The basic strategy for delivering this module will focus on encouraging students' engagement in practical activities while simultaneously enhancing and expanding their critical thinking skills. This will be achieved by combining lectures, laboratory sessions and engaging students in external research on topics in computer technology that interest them.

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

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	12	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً	0.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	75		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (5)	4, 11	LO #Q1: 1-4, Q2: 5
	Assignments	2	10% (5)	3, 10	LO #A1: 1-4, A2: 5

	Lab.	1	10% (10)	14	All
	Report	1	10% (10)	13	All
Summative	**Midterm Exam**	2 hr	10% (10)	9	LO # 1-4
assessment	**Final Exam**	3hr	50% (50)		All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	**Security and Networking:** What is a network? Types of networks. Basic network components. Network Security Basics. Understanding network threats. Network Troubleshooting
Week 2	**E-Commerce:** Concepts of Electronic banking services this include online banking: ATM and debit card services, Phone banking, SMS banking, electronic alert, Mobile banking.
Week 3	**Computer Troubleshooting:** Identifying and solving common hardware and software problems that computer users encounter, Basic troubleshooting techniques and tools for diagnosing and resolving issues.
Week 4	**Computer Troubleshooting:** Identifying and solving common hardware and software problems that computer users encounter, Basic troubleshooting techniques and tools for diagnosing and resolving issues.
Week 5	**Introduction to AI:** Definition of AI, History of AI, AI Techniques and Approaches, Challenges and Ethical Considerations.
Week 6	**Introduction to AI:** Definition of AI, History of AI, AI Techniques and Approaches, Challenges and Ethical Considerations.
Week 7	**AI in Our Daily Lives:** AI in smartphones and virtual assistants like Siri or Google Assistant.)
Week 8	**AI in Our Daily Lives:** AI in smartphones and virtual assistants like Siri or Google Assistant.)
Week 9	**Applications of AI:** Education, Healthcare, Finance, Transportation, Marketing and Advertising.
Week 10	**Applications of AI:** Education, Healthcare, Finance, Transportation, Marketing and Advertising.
Week 11	**Applications of AI:** Education, Healthcare, Finance, Transportation, Marketing and Advertising.
Week 12	**AI and Society:** (How Al affects social, Al and international relations, Al and the future of humanity.)
Week 13	**Ethical Challenges in AI: (AI ethics, privacy and surveillance, the impact of Al on the job market.)**
Week 14	**The Future of AI : (Future trends in Al, recent research and emerging technologies.)**
Week 15	**Preparatory week before the final Exam**

Delivery Plan (Weekly lab. Syllabus)
المنهاج الاسبوعي العملي

	Material Covered

Week 1	**Security and Networking:** What is a network? Types of networks. Basic network components. Network Security Basics. Understanding network threats. Network Troubleshooting
Week 2	**E-Commerce:** Concepts of Electronic banking services this include online banking: ATM and debit card services, Phone banking, SMS banking, electronic alert, Mobile banking.
Week 3	**Computer Troubleshooting:** Identifying and solving common hardware and software problems that computer users encounter, Basic troubleshooting techniques and tools for diagnosing and resolving issues.
Week 4	**Computer Troubleshooting:** Identifying and solving common hardware and software problems that computer users encounter, Basic troubleshooting techniques and tools for diagnosing and resolving issues.
Week 5	**Introduction to AI:** Definition of AI, History of AI, AI Techniques and Approaches, Challenges and Ethical Considerations.
Week 6	**Introduction to AI:** Definition of AI, History of AI, AI Techniques and Approaches, Challenges and Ethical Considerations.
Week 7	**AI in Our Daily Lives:** AI in smartphones and virtual assistants like Siri or Google Assistant.)
Week 8	**AI in Our Daily Lives:** AI in smartphones and virtual assistants like Siri or Google Assistant.)
Week 9	**Applications of AI:** Education, Healthcare, Finance, Transportation, Marketing and Advertising.
Week 10	**Applications of AI:** Education, Healthcare, Finance, Transportation, Marketing and Advertising.
Week 11	**Applications of AI:** Education, Healthcare, Finance, Transportation, Marketing and Advertising.
Week 12	**AI and Society:** (How Al affects social, Al and international relations, Al and the future of humanity.)
Week 13	**Ethical Challenges in AI: (AI ethics, privacy and surveillance, the impact of Al on the job market.)**
Week 14	**The Future of AI : (Future trends in Al, recent research and emerging technologies.)**
Week 15	**Preparatory week before the final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	1. Graham Brown, David Watson, "Cambridge IGCSE Information and Communication Technology", 3rd Edition (2020)	no
Recommended Texts	2. Alan Evans, Kendall Martin, Mary Anne Poatsy, "Technology in Action Complete",16th Edition (2020). 3. Ahmed Banafa, "Introduction to Artificial Intelligence (AI)", 1st Edition (2024). 4 الخضر على الخضر بحاث " أساسيات الحاسوب 2016 5 2005 " الدكتور عادل عبد النور, "مدخل إلى عالم الذكاء الاصطناعي	no
Websites	

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 Information معلومات المادة الدراسية					
Module Title	**Building Construction**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**DWRE 216**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level		2	**Semester of Delivery**		1
Administering Department		Dams and Water Recourses	**College**	Engineering	
Module Leader	Noor khattab		**e-mail**	n.kattab@uomosul.edu.iq	
Module Leader's Acad. Title		Ass.Lecturer	**Module Leader's Qualification**		Msc
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date		26/8/2024	**Version Number**		1.0

<table>
<tr><td colspan="3" align="center">Relation with other Modules
العلاقة مع المواد الدراسية الأخرى</td></tr>
<tr><td>Prerequisite module</td><td></td><td>Semester</td><td></td></tr>
<tr><td>Co-requisites module</td><td>None</td><td>Semester</td><td></td></tr>
</table>

<table>
<tr><td colspan="2" align="center">Module Aims, Learning Outcomes and Indicative Contents
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية</td></tr>
<tr>
<td>Module Aims
أهداف المادة الدراسية</td>
<td>The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering some challenging problems to motivate students.
6. - Brick and block works.
7. - Stone works.
8. - Formworks and scaffolding.
9. - Lintels, beams and columns.
10. - Floors and ceilings.
11. - Moisture blocker works.</td>
</tr>
<tr>
<td>Module Learning Outcomes
مخرجات التعلم للمادة الدراسية</td>
<td>In DWRE 217, initially students will learn Important and useful information about construction of buildings and methods of test construction materials. Upon successful completion of this course the student shall be able to understand:
7. The stages of construction of buildings.
8. Types of foundations.
9. Nature of soil and their relationship to foundations.
10. Types of stresses on hardened concrete.</td>
</tr>
<tr>
<td>Indicative Contents
المحتويات الإرشادية</td>
<td>General introduction of buildings / stages of construction of buildings / steps of implementation / types of buildings / mechanical equipment used in earthworks / methods of groundwater discharge / Nature of soil and their relationship to foundations / Soil classification / Types of foundations / Piles foundation / Cement types / Cement components / aggregate grading / Standard specifications of aggregate / additives / Concrete properties before and after the hardening/Types of stresses on hardened concrete / dimensional and volume changes in concrete / work and production of concrete / methods of calculating weights of concrete mix materials/Concrete Placement and Grading / Maturation of concrete</td>
</tr>
</table>

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	Brick and block works, Properties of fresh concrete, Stone works, Brick tests, Formwork and scaffolding, Test compressive strength of concrete, lintels, beams and columns, Block test, Floors and ceilings, Tiles tests, Steel reinforcement bars tests, Moisture blocker works.

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

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	3	15% (15)	2, 6, 12	LO #1, 2
	Assignments	5	15% (15)	1, 4, 7,11, 14	LO #1, 2
	Report	4	10% (10)	13	LO #1, 2,3,4
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1,2
	Final Exam	2hr	50% (50)	16	LO # 1,2
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	General introduction of buildings, stages of construction of buildings, steps of implementation, types of buildings.
Week 2	Mechanical equipment used in earthworks, methods of groundwater discharge, Determinants of depth of foundations, Nature of soil and their relationship to foundations, Soil classification.

Week 3	Sieve analysis of concrete aggregate / sieve analysis of gravel.
Week 4	Types of foundations, vibrations and foundations, cases requiring the use of Piles foundations.
Week 5	Sieve analysis of sand.
Week 6	Piles foundations, Classification of piles, Piles groups, methods of calculating weights of concrete mixes materials.
Week 7	Specific gravity, Unit weight, moisture content of gravel.
Week 8	Concrete components, Cement types, Cement components, Gravel grading, Standard specifications of aggregates. Specific gravity, Unit weight, moisture content of sand.
Week 9	Additives, Concrete properties before and after the hardening. Find standard Softness and primary and final bonding time for cement paste.
Week 10	Types of stresses on hardened concrete.
Week 11	Find compressive strength of cement mortar for different ages.
Week 12	Dimensional and volume changes in concrete, work and production of concrete.
Week 13	Find tensile strength of cement mortar for different ages.
Week 14	Concrete Placement, Maturation of concrete, and Concrete Works in Hot weather, Classification of concrete by density.
Week 15	**Properties of fresh concrete.**
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	o Construction of buildings, by Zuhair Saku and Artin Levon.	Yes
Recommended Texts	o Test of materials, by Yousif Al Duaf. o Concrete mixtures, written by Dr. Ibrahim Ali Al Darwish, Dr. Abdul Wahab Awad. o Concrete Mix Design o Appendix issued by the Laboratory of testing of construction materials including details and vocabulary for the testing of construction materials. o ACI code.	No
Websites		

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 Information

معلومات المادة الدراسية

Module Title اسم المنهج	اللغة العربية	**Module Delivery**
Module Type نوع المنهج	B	☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**
Module Code رمز المنهج	UOM2012	
ECTS Credits عدد الوحدات	2	
SWL (hr/sem) الحمل الكلي	50	

Module Level / المستوى	2	**Semester of Delivery /** سحب المنهج	1
Administering Department القسم الإداري	هندسة السدود والموارد المائية	**College** الكلية	الهندسة
Module Leader اسم التدريسي	هدى رعد شريف	**e-mail** البريد الالكتروني	huda. shareef@uomosul. edu. iq
Module Leader's Acad. Title	-------	**Module Leader's Qualification**	-------
Module Tutor	-------	**e-mail**	-------
Peer Reviewer Name	------	**e-mail**	E-mail-------

Scientific Committee Approval Date	21/10/2024	**Version Number**	2.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	لا يوجد	**Semester**	
Co-requisites module	لا يوجد	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	الهدف من هذا الفصل الدراسي هو تمكين الطالب من القراءة الصحيحة، وأن يكتسب القدرة على استعمال اللغة استعمالاً صحيحاً في الاتصال مع الآخرين؛ كالسرعة وجودة الإلقاء وحسن التعبير، وتعويده حسن الاستماع وتنمية الذوق الأدبي لدى الطالب وتعويده على التعبيرات السليمة الواضحة.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	**CLO1:** تعريف الطالب بضرورة ممارسة قواعد الكتابة والكلام باللغة العربية الفصيحة. **CLO2:** تعريف الطالب بمستويات نظام اللغة العربية **CLO3:** تعميق اتصال الطالب بالتراث العربي والإسلامي. **CLO4:** تعزيز البحث العلمي في مجال اللغة العربية وعلومها لإعداد الدراسات والبحوث. **CLO5:** إظهار جمال اللغة العربية واتساع معانيها واساليبها الإنشائية. **CLO6:** تمكين الطالب من تجاوز الأخطاء اللغوية وتصحيحها. **CLO7:** تنمية الذوق الأدبي لدى الطالب لإدراك النواحي الجمالية في اسلوب الكلام وصوره ومعانيه. **CLO8:** التعريف بأبرز شعراء العصر العباسي.
Indicative Contents المحتويات الإرشادية	الجزء الأول: (6 ساعات) • قواعد اللغة العربية (النحو) • المبتدأ والخبر • نواسخ المبتدأ والخبر الجزء الثاني: (6 ساعات)

		كان واخواتها
		• إنّ واخواتها
		• ظن واخواتها

الجزء الثالث: (6 ساعات)
- الامتحان الفصلي
- الأسماء المنصوبة
  - المفعول المطلق

الجزء الرابع: (4 ساعات)
- الأخطاء اللغوية
  - الأملاء

الجزء الخامس: (8 ساعات)
- الادب في العصر العباسي
- الشاعر المتنبي
- الشاعر أبو تمام
- الشاعر أبو فراس الحمداني

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies الاستراتيجيات	إنّ الغاية الأساسية من دروس اللغة العربية هو القضاء على الصعوبة والجمود الذي قد يصاحب مواضيع بعض هذه الدروس، بالإضافة إلى إيصال الأفكار والمعلومات المطلوبة إلى الطلاب بطرق مفهومة وتناسب الفروقات الفردية بينهم، ومن أبرز ما تم التركيز عليه في المحاضرات هو قواعد اللغة العربية والأدب وتتمثل الدراسة بالمحاضرات والامتحانات والواجبات داخل الصف والمناقشة والواجبات المنزلية.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**50**		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative Assessment التقويم التكويني	**Quizzes** الكويز	3	5% (15)	4, 8and 10	All
	H.W Assignments الواجبات البيتية	2	5% (10)	6, 7	CLO4, CLO5, and CLO6

	Seminars السمنار	1	5% (5)	12	All
	On-site Assignment واجبات داخل الصف	2	5% (10)	6, 10	CLO4, CLO5, and CLO6
Summative Assessment التقويم التلخيصي	**Midterm Exam** امتحان نصف الفصل	2 hrs	10% (10)	7	All
	Final Exam الامتحان النهائي	3 hrs	50% (50)	16	All
Total Assessment / التقويم النهائي			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered / المواضيع المغطاة
Week 1	قواعد اللغة العربية (النحو)
Week 2	المبتدأ والخبر
Week 3	نواسخ المبتدأ والخبر
Week 4	كان واخواتها
Week 5	إن واخواتها
Week 6	ظن واخواتها
Week 7	الامتحان الفصلي
Week 8	الأسماء المنصوبة
Week 9	المفعول المطلق
Week 10	الأخطاء اللغوية
Week 11	الأملاء
Week 12	الادب في العصر العباسي
Week 13	الشاعر المتنبي
Week 14	الشاعر أبو تمام
Week 15	الشاعر أبو فراس الحمداني
Week 16	الامتحان النهائي

Delivery Plan (Weekly Lab. Syllabus)

	Material Covered / المواضيع المغطاة
Week 1	لا يوجد
Week 2	لا يوجد

Week 3		لا يوجد
Week 4		لا يوجد
Week 5		لا يوجد
Week 6		لا يوجد
Week 7		لا يوجد

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text الاسم	Available in the Library? هل متوفر في المكتبة؟
Required Texts المنهج المطلوب	النحو الوافي / عباس حسن	نعم
Recommended Texts المنهج الموصى به	في الأدب العباسي / محمد مهدي البصير	نعم
Websites المواقع الالكترونية	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 Information
معلومات المادة الدراسية

Module Title	**Engineering Analysis**	Module Delivery	
Module Type	**B**	☒ Theory	

Module Code	**DWRE 221**			☒ **Lecture**
				☐ **Lab**
ECTS Credits	**5**			☒ **Tutorial**
				☐ **Practical**
SWL (hr/sem)	**125**			☐ **Seminar**

Module Level	2	**Semester of Delivery**	2
Administering Department	Dams and water resources Department	**College**	College of Engineering
Module Leader	Ali Ahmed Abdulmawjood	**e-mail**	aliabdulmawjood@uomosul.edu.iq
Module Leader's Acad. Title	Assistant lecturer	**Module Leader's Qualification**	Msc
Module Tutor		**e-mail**	
Peer Reviewer Name		**e-mail**	
Scientific Committee Approval Date	10/9/2024	**Version Number**	1.0

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

Module Aims, Learning Outcomes and Indicative Contents	
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	To introduce students to the concept of differential equations and their significance in engineering and scientific applications. To provide students with the necessary skills to solve first order differential equations using separation of variables, and to classify them as homogeneous, non-homogeneous, exact and non-exact D.E's. To teach students how to solve linear and non-linear first order differential equations, as well as higher order differential equations. To familiarize students with the solution of second and higher order linear differential equations, with both constant and variable coefficients, and to teach them how to apply the variation of parameters method. To provide students with an understanding of simultaneous linear differential equations and their applications in engineering.

	To equip students with the ability to analyze physical and engineering problems by setting up and solving differential equations.
	To impart an understanding of Laplace transforms and how they can be used for the solution of differential equations.
	Overall, this course aims to provide a thorough understanding of differential equations and their use in various engineering and scientific applications. By the end of this module, students should be able to solve a variety of differential equations, both analytically and numerically, and apply this knowledge to real-world problems.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	On successful completion of this course students will be able to: 1. Define differential equations and classify them based on their degree, order, and formation. 2. Solve first-order differential equations using separation of variables. 3. Analyze and solve homogeneous, non-homogeneous, exact, and non-exact differential equations. 4. Classify differential equations as linear or non-linear and solve linear first-order differential equations. 5. Solve higher-order differential equations of varying degrees. 6. Solve second- and higher-order linear differential equations using the characteristic equation and general solutions. 7. Solve second- and higher-order linear differential equations with constant coefficients. 8. Solve second- and higher-order linear differential equations with variation of parameters. 9. Solve a system of linear differential equations using matrix methods. 10. Apply first-order differential equations to physical and engineering problems. 11. Utilize second-order differential equations to solve physical and engineering problems. 12. Apply second-order differential equations to model physical systems in various engineering applications. 13. Derive solutions for second-order differential equations in a specific engineering domain. 14. Use Laplace transforms to solve differential equations, including finding solutions from initial and boundary conditions.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1. Definition, Forming, Order and Degree of Differential Equation [4hr] 2. Solution of the first order D.E Separation of variables [4hr] 3. Homogeneous, non-homogeneous, Exact and not exact D.E [4hr] 4- Linear and nonlinear first order D.E 5. First order and higher degree D.E [4hr] 6. Solution of second and higher order linear D.E [4hr] 7. Solution of second and higher order linear D.E with constant coefficient 8. Solution of second and higher order linear D.E with variation of parameter [4hr] 9. Simultaneous linear D.E [4hr] 10. Physical and engineering application on first order D.E [8hr] 11. Physical and engineering application on second order D.E [8hr] 12. Laplace TransformDerivative of Newton forward and backward differences [8hr]

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

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

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	20% (20)	5, 11	LO #1:5 and 6:11
	Assignments	3	15% (15)	3, 7, 9	LO # 2 , 6 and 8
	Projects / Lab.	0	0% (0)		
	Report	1	5% (5)	13	All
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1:6
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered

Week 1	Defintion, Forming,Order and Degree of Differential Equation
Week 2	Solution of the first order D.E.Separation of variables
Week 3	Homogeneous, non-homogeneous Exact and not exact D.E
Week 4	Linear and nonlinear first order D.E
Week 5	First order and higher degree D.E
Week 6	Solution of second and higher order linear D.E
Week 7	Solution of second and higher order linear D.E with constant coefficient
Week 8	Solution of second and higher order linear D.E with variation of parameter
Week 9	Simultaneous linear D.E
Week 10	Physical and engineering application on first order D.E
Week 11	Physical and engineering application on first order D.E
Week 12	Physical and engineering application on second order D.E Physical and engineering application on second order D.E
Week 13	Physical and engineering application on second order D.E Physical and engineering application on second order D.E
Week 14	Laplace Transform
Week 15	Laplace Transform
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	• Theory and Problems of Differential Equations	Yes
Recommended Texts	• By Frank Ayres, JR,PhD • Advanced Engineering Mathematics By Dass	No
Websites		

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 Information
معلومات المادة الدراسية

Module Title	**Fluid Mechanics 2**	Module Delivery	
Module Type	**<u>Core</u>**	☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	DWRE 222		
ECTS Credits	**<u>5</u>**		
SWL (hr/sem)	**<u>125</u>**		
Module Level	2	**Semester of Delivery**	2
Administering Department	Type Dept. Code	**College**	Type College Code
Module Leader	Azza Nasralla Jaralla Al-talib	**e-mail**	a.altalib@uomosul.edu.iq
Module Leader's Acad. Title	Asst. Prof.	**Module Leader's Qualification**	M.Sc.
Module Tutor	Name (if available)	**e-mail**	E-mail
Peer Reviewer Name	Name	**e-mail**	E-mail
Scientific Committee Approval Date	20/08/2024	**Version Number**	1.0

Relation with other Modules
العلاقة مع المواد الدراسية الأخرى

Prerequisite module	Fluid mechanics 1, code:DWRE 212	**Semester**	1
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

<div dir="rtl">أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية</div>

Module Aims <div dir="rtl">أهداف المادة الدراسية</div>	The fluid mechanics is the basic subject for second-stage students in the dams and water resources engineering department that from this subject student will learn and practice to velocity and acceleration of water flow. Conservation of mass: the continuity equation. One two three-dimensional flow, steady and unsteady flow. One dimensional flow Euler's equation, Bernoulli's equation determination and Application of Bernoulli's equation (venturi meter, orifice and sluice gate). Momentum equation determination and application.
Module Learning Outcomes <div dir="rtl">مخرجات التعلم للمادة الدراسية</div>	1. learn and practice to velocity measurements of water flow and calculated. 2. learn and practice to discharge measurements of water flow and calculated. 3. learn the conservation of mass: the continuity equation. 4. Determine discharge using Bernoulli's equation 5. Determine momentum by applying momentum equation. i 6. Appy of Bernoulli's and momentum equations on doing experiments in hydraulic laboratory.
Indicative Contents <div dir="rtl">المحتويات الإرشادية</div>	Indicative content includes the following. Introduction, [15 hrs] **fluid kinematics** [15 hrs] types of fluid flow [15 hrs] types of flow lines [15 hrs] conservation of mass continuity equation [15 hrs] Types of head or energy of a flow in motion [10 hrs] Bernoulli's equation [10 hrs]

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

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

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	47	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered

Week 1	Introduction
Week 2	**fluid kinematics**
Week 3	types of fluid flow
Week 4	types of flow lines
Week 5	conservation of mass continuity equation
Week 6	continuity equation
Week 7	Mid-term Exam
Week 8	Types of head or energy of a flow in motion
Week 9	Bernoulli's equation
Week 10	Application of Bernoulli's equation
Week 11	Tutorials and problem solve
Week 12	Pumps in the Bernoulli Equation
Week 13	The impulse-momentum equation
Week 14	Applied problems on Bernoulli's equation
Week 15	Applied problems on Pumps in the Bernoulli Equation and momentum
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)
المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Discharge Measurements in Pipes by Orifice Meter
Week 2	Lab 2: Discharge Measurements in Pipes by Venturi Meter
Week 3	Lab 3: Friction Factor in Pipes
Week 4	Lab 4: Discharge Measurement in Open Channel by Weirs
Week 5	Lab 5: Discharge Measurement in Open Channel by Weirs
Week 6	Lab 6: Hydraulic Jump in open channel
Week 7	Lab 7: Hydraulic Jump in open channel

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Elementary fluid mechanics By: Vinnard 6th ed. 1981	Yes
Recommended Texts	fluid mechanics by MERLE C. POTTER, DAVID C. WIGGERT 2008	No
Websites	https://www.coursera.org/browse/physical-science-and-engineering/fluid-mechanics	

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 Information
معلومات المادة الدراسية

Module Title	**Structures**	Module Delivery	
Module Type	**B**	☒ **Theory**	
Module Code	DWRE 223	☒ **Lecture**	
ECTS Credits	**6**	☐ **Lab**	
SWL (hr/sem)	**150**	☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	

Module Level	2	Semester of Delivery	2
Administering Department	Dam and water resources	**College**	Engineering
Module Leader	Dr. Mohammed M. Khalaf	**e-mail**	mohammedmukhlifkhalaf@uomosul.edu.iq
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	Ph.D.
Module Tutor	Name (if available)	**e-mail**	E-mail
Peer Reviewer Name		**e-mail**	
Scientific Committee Approval Date	16/09/2024	**Version Number**	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	Strength of Materials	**Semester**	Fall
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	1. Study the basic principles for structures. 2. Analyze the statically determinate structures. 3. Determine the elastic deformations of the statically determinate structures by using different methods. 4. Solve the indeterminate statically structures by using different methods.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Find out stability and determinacy of structures, 2. Analyze the statically determinate structures 3. Evaluate the elastic deformation of structures by virtual work (unit load) method 4. Evaluate the elastic deformation of structures by Castigliano`s first theorem method 5. Analyze the statically indeterminate structures by consistent deformation method 6. Analyze the statically indeterminate beams and frames by least work method 7. Analyze the statically indeterminate beams and frames by slope-deflection method 8. Analyze the statically indeterminate beams and frames by moment distribution method
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A – Determinate Structures Stability and determinacy of structures, Analysis of the statically determinate structures. [4 hrs] The elastic deformation of beams by virtual work (unit load) method, The elastic deformation of frames by virtual work (unit load) method. [4 hrs] The elastic deformation of trusses by virtual work (unit load) method. [4 hrs] The elastic deformation of beams by Castigliano`s first theorem method, The elastic deformation of frames by Castigliano`s first theorem method. [4 hrs] The elastic deformation of trusses by Castigliano`s first theorem method. [4 hrs]  Part B - Indeterminate Structures Analysis the statically indeterminate beams by method of consistent deformation, Analysis the statically indeterminate frames by method of consistent deformation [4 hrs] The elastic deformation of trusses by Castigliano`s first theorem method. [4 hrs]

	Analysis the statically indeterminate beams by consistent deformation method [4 hrs]
	Analysis the statically indeterminate frames by consistent deformation method [4 hrs]
	Analysis the statically indeterminate beams by least work method [4 hrs]
	Analysis the statically indeterminate frames by least work method [4 hrs]
	Analysis the statically indeterminate beams by slope-deflection method [4 hrs]
	Analysis the statically indeterminate frames by slope-deflection method method [4 hrs]
	Analysis the statically indeterminate beams by moment distribution method [4 hrs]
	Analysis the statically indeterminate frames by moment distribution method [4 hrs]

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials involving some sampling activities that are interesting to the students.

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

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	1	5% (5)	11	LO #5 and 6
	Assignments	2	5% (5)	5, 14	LO # 3-8
Summative assessment	**Midterm Exam**	2	30% (30)	6, 15	LO # 1-4 and 5-8
	Final Exam	3hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Stability and determinacy of structures, Analysis of the statically determinate structures
Week 2	The elastic deformation of beams by virtual work (unit load) method, The elastic deformation of frames by virtual work (unit load) method
Week 3	The elastic deformation of trusses by virtual work (unit load) method
Week 4	The elastic deformation of beams by Castigliano`s first theorem method, The elastic deformation of frames by Castigliano`s first theorem method
Week 5	The elastic deformation of trusses by Castigliano`s first theorem method
Week 6	Exam I
Week 7	Analysis the statically indeterminate beams by method of consistent deformation, Analysis the statically indeterminate frames by method of consistent deformation
Week 8	Analysis the statically indeterminate trusses by method of consistent deformation
Week 9	Analysis the statically indeterminate beams by least work method
Week 10	Analysis the statically indeterminate frames by least work method
Week 11	Analysis the statically indeterminate beams by slope-deflection method
Week 12	Analysis the statically indeterminate frames by slope-deflection method
Week 13	Analysis the statically indeterminate beams by moment distribution method
Week 14	Analysis the statically indeterminate frames by moment distribution method
Week 15	Exam II
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Non
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	Elementary Theory of Structures, YUAN-YU HSIEH, PRETICE-HALL, 1980.	Yes
Recommended Texts	Hibbeler R. C. (2012). Structural analysis (8th ed.). Pearson/Prentice Hall.	No

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 Information
معلومات المادة الدراسية

Module Title	**Surveying II**	**Module Delivery**	
Module Type	**Core**	☒ Theory ☐ Lecture ☒ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Code	DWRE 224		
ECTS Credits	**4**		
SWL (hr/sem)	**100**		
Module Level	2	**Semester of Delivery**	2
Administering Department	DWRE 224	**College**	Engineering
Module Leader	Dr. Omar Muqdad Abdulgany	**e-mail**	O.agha@uomosul.edu.iq
Module Leader's Acad. Title	Asst.Prof.	**Module Leader's Qualification**	Ph.D.
Module Tutor	Alaa A. Nasar	**e-mail**	E-mail
Peer Reviewer Name		**e-mail**	E-mail
Scientific Committee Approval Date	20/08/2023	**Version Number**	1.0

Relation with other Modules
العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	Surveying II aims to teach students how to calculate the earthworks and reservoir volumes from contour maps, bearing of lines, designation of bearing, theodolite, construction and adjustment of the theodolite, measurement of angles, traverse surveys and their adjustment, tachometer, and total station.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	On successful completion of this course students will be able to: 1- To understand different types of survey (i). 2-To calculate areas using different methods(i) 3-To calculate volumes using different methods(i)

	4- To determine and choose the appropriate method for calculating earthwork volumes (iii) 5- To use plane surveying instruments such as: Theodolite, Tachometry and Total station (iii) 6- To choose appropriate equipment for specific survey measurements (iii).
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A: Area and Volumes Introduction, Irregular figures, Give and take lines, Counting squares, Trapezoidal Rule, Simpson Rule (for odd number) [12 hrs] Volumes Earthwork calculation, Volumes from cross-sections, Sections level a cross (one level section), Sections with a cross fall (two level section),Sections part in cut and part in fill, Section of variable levels (three level section), Multi-level section Computation of volumes, mean areas, end areas, Prismoidal formula, The volume of a pyramid, The Volume of wedge, [15 hrs] Simpson′s Rule for Volumes, Volumes from spot levels or (volume of Borrow), Volume from contour lines [9 hrs] Part B – Theodolite and Tachometry, and Totalstation Bearing, Designation of Bearings, whole circle system, Quadrantal system, Deflection angle, Fore and Back Bearings , Calculation of bearings from angles, Calculation of deflection angles from included angles. [18 hrs] The theodolite and traverse surveying, Traverse computations, Latitudes and departure, Closing error, Graphical adjustment, bowditch's rule, Transit rule, Distribution of the angular error [15 hrs] Tachometry, Optical principles, Determine the stadia interval factor [15 hrs] Total station [6hrs]

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

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

Student Workload (SWL)			
الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	22	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation				
تقييم المادة الدراسية				
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
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Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 8,9 and 10
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	15% (15)	Continuous	All
	Report	7	5% (5)	3,4,5,6,7,9,10	LO # 2, 3,4, 6,10 and 10
Summative assessment	**Midterm Exam**	2 hr	10% (10)	8	LO # 1-8
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
المنهاج الاسبوعي النظري	
	Material Covered

Week 1	Introduction, Irregular figures, Give and take lines, Counting squares.
Week 2	Counting squares, Trapezoidal Rule, Simpson Rule (for odd number),Quiz No.1
Week 3	Volumes Earthwork calculation, Volumes from cross-sections, Sections level a cross (one level section), Sections with a cross fall (two level section).
Week 4	Sections part in cut and part in fill, Section of variable levels (three level section), Multi-level section
Week 5	Computation of volumes, mean areas, end areas, Prismoidal formula.
Week 6	The volume of a pyramid, The Volume of wedge.
Week 7	Simpson′s Rule for Volumes, Volumes from spot levels or (volume of Borrow), Volume from contour lines
Week 8	Mid-term Exam, Bearing, Designation of Bearings,
Week 9	Deflection angle, Fore and Back Bearings. Calculation of bearings from angles,
Week 10	Calculation of deflection angles from included angles, Quiz No.2
Week 11	The theodolite and traverse surveying, Traverse computations, Latitudes and departure.
Week 12	Closing error, Graphical adjustment, bowditch's rule, Transit rule, Distribution of the angular error
Week 13	Tachometry, Optical principles, Determine the stadia interval factor
Week 14	Tachometry, Optical principles , Total station
Week 15	Total station
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Planimeter
Week 2	Lab 2: Contour mapping using the surfer software
Week 3	Lab 3: Theodolite
Week 4	Lab 4: Layout a building on graph paper using Theodolite.
Week 5	Lab 5: Traverse surveying
Week 6	Lab 6: Measure distances using Tachometry.
Week 7	Lab 7: Total station

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?

Required Texts	Surveying (A.Bannister & S.Raymond)	Yes
Recommended Texts	Surveying by (S.K.Hussin and M.SNagaraj)	No
Websites		

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 Information
معلومات المادة الدراسية

Module Title	**Soil Physics**	Module Delivery	
Module Type	Core	☒ Theory ☐ Lecture ☒ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Code	**DWRE 225**		
ECTS Credits	**6**		
SWL (hr/sem)	**150**		
Module Level	2	Semester of Delivery	2
Administering Department	Dam and water resources engineering	College	Engineering
Module Leader	Mohammad Tarik Mahmood	e-mail	m.altaiee@uomosul.edu.iq
Module Leader's Acad. Title	Instructor	Module Leader's Qualification	Ms.c

Module Tutor	Dr. Abdulazeez Abdulbasit Mohamed Abdulghani khalaf mohammed	e-mail	abdulazeez.mohammed@uomosul.edu.iq alrobaai1982@uomosul.edu.iq
Peer Reviewer Name		e-mail	
Scientific Committee Approval Date	14/09/2024	Version Number	1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	4. Soil structure: arrangement and organization of soil particles 5. Soil porosity, permeability, and water movement 6. Understanding soil structure is important for optimizing soil management practices such as irrigation, drainage, and soil compaction. 7. To Understand as follows: movement, distribution water in the soil. 8. Understanding soil water dynamics such as infiltration, evaporation, water storage, and capillary rise. 9. Crucial for efficient water management
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understanding soil physical properties soil texture, structure, density, porosity, and water retention characteristics. 2. To Knowledge movement and distribution of water in soils. 3. Identify Soil water potential & how it affects plant growth. 4. Giving students basic idea about Soil-plant-water relationships 5. Enable the student to analyze laboratory data 6. Knowledge the student about soil temperature dynamics. 7. Learn students about the soils compaction characteristics. 8. Understand how soil compaction affects soil properties. 9. Develop the skills of student about thinking, analysis by soil space 10. Students should gain practical experience in conducting soil physics experiments, field measurements, and data collection.

Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part – A Fundamental of Soil Physics Introduction, Physical soil properties – Mass and volume relations, Soil water flow condition [12 hrs] Soil water potential, Soil water Characteristic curve – Water flow in saturated soil, Darcy equation [12 hrs] Hydraulic conductivity and permeability – Water flow in unsaturated soil [12 hrs] The general flow equation –The general flow equation (Richard's equation) [12 hrs] Part- B Water management Introduction to water management, infiltration – internal drainage and moisture redistribution after infiltration, evaporation in the presence of ground [12 hrs] evaporation with water levels and the risk of salinization, water balance of the root zone – salinization and land classification affected by salts, Salt balance equation [12 hrs] leashing requirements – reclamation leaching [12 hrs] Reclamation of gypsum and limestone soils [6 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Learning and teaching strategies play a crucial role in facilitating effective education in soil physics. Here are some common strategies that can be employed for both learning and teaching in this field: Lectures: Lectures provide an opportunity for instructors to present key concepts, theories, and principles of soil physics to students. They can use visual aids, demonstrations, and real-life examples to enhance understanding. Students can take notes, ask questions, and engage in discussions during or after the lecture.

	Laboratory Work: Practical laboratory sessions allow students to gain hands-on experience in conducting soil physics experiments and measurements. They can learn techniques for soil sampling, analysis of soil physical properties.

Student Workload (SWL)			
الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	6.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	57	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation					
تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	4, 9	LO #1, 2, 3, 4 and 10
	Assignments	1	10% (10)	8	LO # 1-8
	Projects / Lab.	1	10% (10)	12	LO # 1-12
	Report	1	10% (10)	13	LO # 1-13
Summative assessment	Midterm Exam	1	10% (10)	14	LO # 1-13
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction, Physical soil properties.
Week 2	Mass and volume relations, Soil water flow condition.
Week 3	Soil water potential.

Week 4	Soil water Characteristic curve.
Week 5	Water flow in saturated soil, Darcy equation.
Week 6	Hydraulic conductivity and permeability.
Week 7	Water flow in unsaturated soil.
Week 8	The general flow equation (Richard's equation).
Week 9	Introduction to water management, infiltration.
Week 10	internal drainage & moisture redistribution after infiltration, evaporation in the presence of ground.
Week 11	evaporation with water levels and the risk of salinization, water balance of the root zone.
Week 12	salinization and land classification affected by salts, Salt balance equation.
Week 13	leashing requirements.
Week 14	reclamation leaching.
Week 15	Reclamation of gypsum and limestone soils.
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Description of the field, soil profile, soil samples Collection and Examination of soil textured.
Week 2	Estimation of moisture content.
Week 3	Tensiometer and estimation of capillary tension.
Week 4	Determination of soil field capacity and wilting point.
Week 5	Determination of hydroscopic and capillary water of soil.
Week 6	Estimating the saturation percentage in the soil and preparing the soil extract.
Week 7	Estimation of Soil pH reaction and dissolved salts in soil EC.
Week 8	Volumetric analysis of different soil particles by hydrometer.
Week 9	Volumetric analysis of different soil particles by Sieving.
Week 10	Determination of Bulk density.
Week 11	Determination of soil particle density and pore space.
Week 12	Estimation of Hydraulic conductivity by constant head.
Week 13	Estimation of Hydraulic conductivity by falling head.
Week 14	Infiltration experiment.
Week 15	Estimation of soil color.

Learning and Teaching Resources

	Text	Available in the Library?
	مصادر التعلم والتدريس	

		Available in the Library?
	Text	
Required Texts	فيزياء التربة التطبيقية ترجمة وإعداد الدكتور سمير خليل الخفاف – مجلس البحث العلمي. بغداد – العراق Established Land reclamation and cultivation Prof. Dr. Al-Metwally Mustafa Saleem	Yes
Recommended Texts	فيزياء التربة – تأليف الدكتور هشام محمود حسن جامعة الموصل / كلية الزراعة والغابات Field guide for hill land reclamation and water management Mohamed Sabir,	Yes
Websites	Soil Physics by Dr. David L. Lindbo (University of Kentucky): This website offers lecture notes, course materials, and resources on various aspects of soil physics. It covers topics such as soil water, soil temperature, soil mechanics, and soil-plant relationships. Website: https://www.uky.edu/Ag/Soils/soils-pss443	

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 Information
معلومات المادة الدراسية

Module Title	**English Language II**	Module Delivery
Module Type	**Support**	☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**
Module Code	**UOM 2022**	
ECTS Credits	**2**	
SWL (hr/sem)	**50**	

Module Level	2	Semester of Delivery	2
Administering Department	DWRE	College	COE
Module Leader		e-mail	
Module Leader's Acad. Title		Module Leader's Qualification	
Module Tutor	Name (if available)	e-mail	E-mail
Peer Reviewer Name	Name	e-mail	E-mail
Scientific Committee Approval Date	14/06/2023	Version Number	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims and Learning Outcomes	Students will be able to: 1. Distinguish between dependent, Independent, and Integrated essays. 2. Find the topic and the thesis statement of short essays. 3. Identify the main ideas from the introduction paragraph. 4. Identify the main ideas from the body paragraph. 5. Find the supporting details from the introduction paragraph. 6. Find the supporting details from the body paragraph. 7. Draw an outline to link the ideas, supporting details, and essay topic. 8. Make notes in response to an essay question to create main ideas, supporting details, and thesis statement. 9. Write the introduction paragraph on basis of the thesis statement and main ideas. 10. Build the body paragraphs based on main ideas and supporting details. 11. Write the introduction paragraph based on the main ideas. 12. Enhance the smoothness and fluency of an essay by employing transition words and sentence starters.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Classification of Essays:** [2 hrs] - Independent essays based on personal thoughts. - Dependent essays based on data, figures, diagrams. - Integrated essays **Structure of academic essays:** [6 hrs]

	- Analyzing academic essays according to the standard structure of academic essays.
	Idea Maps: [3 hrs]
	- Filling the idea maps from the major information extracted while reading an essay.
	Responding to an essay question: [4 hrs]
	- Building an outline using personal ideas in response to an essay question.
	Writing Paragraphs: [6 hrs]
	- Writing thesis statement.
	- The Introduction Paragraph.
	- The Body Paragraphs.
	Essay Conclusion: [3 hrs]
	- Writing the conclusion paragraph considering the main ideas stated in the introduction and body paragraphs
	Transition words and connection phrases: [3 hrs]
	Dependent essays: [3hrs]
	- Introduction to essays based on figures, tables, diagrams, and processes

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	The approach to be followed here is to motivate students to analyze previously written model essays to understand the standard structure of academic essays then implement the same procedures to build their own essays.

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.13
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 3, 8 and 10
	Assignments	2	10% (10)	3, 12	LO # 5, 6,11 and 12
	Projects / Lab.				

	Report	1	20% (20)	14	LO # 1-10
Summative assessment	**Midterm Exam**				
	Final Exam	3hr	60% (60)	15	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Overview of Academic Essays Independent, Dependent, and Integrated essays Structure of academic essays
Week 2	Structure of academic essays
Week 3	Topic sentence and thesis statement Identifying topic sentence and thesis statement of academic essays.
Week 4	Main Ideas: Identifying the main Ideas of academic essays.
Week 5	Supporting Details: Identifying the supporting details
Week 6	Essay outlines: Building Essay outlines using idea maps
Week 7	Essay Questions: Responding to essay questions by making personal notes
Week 8	Topic Sentence : Writing a thesis statement or topic sentence using personal thoughts.
Week 9	Personal Thoughts: Using personal thoughts to express main ideas and supporting details in response to an essay question.
Week 10	Idea Map Creation: Building an idea map of an essay question.
Week 11	Transition words and sentence starters Increasing the fluency, coherence, and smooth transition of thoughts using sentence starters and transition words.
Week 12	Writing the Introduction: Combining the thesis statement and main ideas together to build the introduction paragraph.
Week 13	Writing the Conclusion
Week 14	Introduction to dependent writing tasks
Week 15	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: There are no laboratory experiments.
Week 2	Lab 2: There are no laboratory experiments.

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	➢ No Textbook is required for this course. Supplemental materials will be provided by provided by the instructor.	
Recommended Texts	➢ *Sharpe, P. J. (2009). Barron's TOEFL iBT. Barron's Educational Series.* ➢ *Lougheed, L. (2016). Barron's Ielts with Mp3 Cd. Barron's.*	No
Websites		

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 is required, but credit is given.
	F – Fail	راسب	(0-44)	A significant amount of work is 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.

1. Course Name:
The crimes of the baath regime in Iraq
2. Course Code:
3. Semester/Year:
2024−2023
4. Description Preparation Date:

2024-12-4

5. Available Attendance Forms:
Individual group

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

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

Name: Marwa mohammed ameen

Email: marwa.ameen@uomosul.edu.iq

8. Course Objectives

| Course Objectives | • Educating students about the crimes committed by the Baath regime in Ir ....
• Guiding students to familiarize themselves With crimes............
• Educating students about the seriousness of crimes............ |
|---|---|

9. Teaching and Learning Strategies

Strategy	Through the prescribed book

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or Subject Name	Learning Method	Evaluation Method

				View Sfe minutes a contribution	Written lecture
First	2		The concept crimes and thei types		
second	2		Types of trinational crime		
			Political crime Exam	=	=
third	2		Sociai	=	=
fourth	2		Crime		
fifth	2		The crime of suppressing the Shaaban uprising	=	=
sixth			psychologial	=	=
Seventh	2		crimes of the baath	=	=
Eighth	2		regime of disrupting Friday	=	=
Ninth	2		prayers Mass grave crimes	=	=
10th	2			=	=
Eleven	2		Chemical attack on Haiabja		
				=	=

			Use of internationally	=	=
twelfth	2				
Thirteenth	2		Exam	=	=
Fourth	2		Environmental crimes of the		
			baath regime in Iraq	=	=
Fifteenth	2		Incidents of cemeteries and genocide committed dy the Baathist regime in Iraq	=	=

11. Course Evaluation

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

2.The daily exam

3.Numders of activities within the class

4.Question−answer and exam

5.Monthly exam…. etc

12. Learning and Teaching Resources

Required textbooks(curricular books, if any)	Course book
Main references (sources)	

Recommended books and references (scientific journals, reports)	
Electronic references, websites	

Third Level

الملاحظات	رمز المقرر	الممهد ان وجد	عدد الوحدات	عدد الساعات العملية	عدد الساعات النظرية	اسم المقـــرر باللغة الإنكليزية	اسم المقـــرر باللغة العربية	نوع المتطلب (اجباري – اختياري)	اسم المتطلب
						المستوى الدراسي الثالث (الفصل الاول)			
	DWR 340	Calculus IV	٢	1	٢	Engineering Analysis	تحليلات هندسية	اجباري	متطلبات القسم
	DWR 341	Fluid Mechanics II	٢	-	٢	Hydraulics	هيدروليك	اجباري	
	DWR 342	-	٢	-	٢	Surface Hydrology	هيدرولوجيا المياه السطحية	اجباري	
	DWR 343	Water Management and Land Reclamation	٢	-	٢	Irrigation Principles and Practices	اسس الري وعملياته	اجباري	
	DWR 344	Strength of Materials II	٢	1	٢	Theory of Structures I	نظرية المنشات I	اجباري	
	DWR 345	Strength of Materials II and Construction Material Technology	٢	-	٢	Concrete Design	تصاميم الخرسانة	اجباري	
	DWR 346	Water Management and Land Reclamation	٢	٢	١	Soil Mechanics I	ميكانيك التربة I	اجباري	
	DWR 347	-	٢	٢	1	Computer Applications in Water Resources I	تطبيقات الحاسوب في الموارد المائية I	اجباري	
يختار الطالب مقرر واحد. عدد الوحدات المطلوبة = ٢ وحدة	DWR 391	-	٢		٢	River Mechanics	ميكانيك الانهر	اختياري	
	DWR 394	-	٢	-	٢	Statistical Methods in Hydrology	الطرق الإحصائية في الهيدرولوجيا	اختياري	
			١٨	6	١٦	مجموع ساعات ووحدات الفصل الدراسي الأول			

الملاحظات	رمز المقرر	المهد ان وجد	عدد الوحدات	عدد الساعات العملية	عدد الساعات النظرية	اسم المقـــرر باللغة الإنكليزية	اسم المقـــرر باللغة العربية	نوع المتطلب (اجباري – اختياري)	اسم المتطلب
	-	-	2	---	2	English Language - Intermediate	اللغة الانكليزية - المتوسط	اجباري	متطلبات الجامعة
اجباري لطلبة القسم	ENGE320	Calculus I and Calculus II	٢	---	٢	Numerical Analysis	التحليلات العددية	اختياري	متطلبات الكلية
	DWR 348	Hydraulics	٢	---	٢	Open Channels and Hydraulic Machines	القنوات المفتوحة والآلات الهيدروليكية	اجباري	متطلبات القسم
	DWR 349	Surface Hydrology	٢	---	٢	Groundwater Hydrology	هيدرولوجيا المياه الجوفية	اجباري	
	DWR 350		٢	---	٢	Drainage Engineering	هندسة البزل	اجباري	
	DWR 351	Soil Mechanics I	٢	٢	١	Soil Mechanics II	ميكانيك التربة II	اجباري	
	DWR 352	Irrigation Principles and Practices	٢	---	٢	Consumptive Use and Water Duty	الاستهلاك والمقننات المائية	اجباري	
يختار الطالب مقرر واحد. عدد الوحدات المطلوبة = ٢ وحدة	DWR 392		٢	---	٢	Theory of Structures II	نظرية المنشآت II	اختياري	
	DWR 393	Concrete Design	٢	---	٢	Reinforced Concrete Design	تصميم الخرسانة المسلحة	اختياري	
يختار الطالب مقرر واحد. عدد الوحدات المطلوبة = ٢ وحدة	DWR 395		٢	---	٢	Field Flow Measurements and Analysis	قياسات الجريان الحقلي وتحليلاته	اختياري	
	DWR 396		٢	---	٢	Computer Applications in Water Resources II	تطبيقات الحاسوب في الموارد المائية II	اختياري	
			١٨	٢	١٧		مجموع ساعات ووحدات الفصل الدراسي الثاني		

ملاحظة: التدريب الصيفي (Summer Training) من متطلبات التخرج المطلوبة بعد اكمال الطالب المستوى الثالث للفترة من ١ تموز إلى ٣١ تموز أو من ١ آب إلى ٣١ آب.

Course Description Form

1. Course Name:
Engineering Analysis

2. Course Code:
DWR 340

3. Semester / Year:
2/2024-2025

4. Description Preparation Date:
1/9/2023

5. Available Attendance Forms:
Theoretical lectures in class

6. Number of Credit Hours (Total) / Number of Units (Total)
3/2

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

8. Course Objectives

Course Objectives	• To introduce students to the concept of differential equations and their significance in engineering and scientific applications. (i) • To provide students with the necessary skills to solve first order differential equations using separation of variables, and to classify them as homogeneous, non-homogeneous, exact and non-exact D.E's. (i) • To teach students how to solve linear and non-linear first order differential equations, as well as higher order differential equations. (i)

- To familiarize students with the solution of second and higher order linear differential equations, with both constant and variable coefficients, and to teach them how to apply the variation of parameters method. (ii)
- To provide students with an understanding of simultaneous linear differential equations and their applications in engineering. (ii)
- To equip students with the ability to analyze physical and engineering problems by setting up and solving differential equations. (ii)

Overall, this course aims to provide a thorough understanding of differential equations and their use in various engineering and scientific applications. By the end of this module, students should be able to solve a variety of differential equations, both analytically and numerically, and apply this knowledge to real-world problems.

9. Teaching and Learning Strategies

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

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Defintion, Forming,Order and Degree of Differential Equation	Defintion of Differential Equation	Theoretical lectures in class	Exam
2	3	Solution of the first order D.E.Separation of variables	Solution of the first order D.E.	Theoretical lectures in class	HW & Exam
3	3	Homogeneous, non-homogeneous D.E	Solution of the first order D.E.	Theoretical lectures in class	HW & Exam
4	3	Exact and not exact D.E	Solution of the first order D.E.	Theoretical lectures in class	HW & Exam
5-7	9	Linear and nonlinear first order D.E	Solution of the first order D.E.	Theoretical lectures in class	HW & Exam
108-	9	First order and higher order D.E	Solution of the higher order D.E	Theoretical lectures in class	HW & Exam
11	3	Solution of second and higher order linear D.E with constant coefficient	Solution of the higher order D.E	Theoretical lectures in class	HW & Exam
12	3	Simultaneous D.E	Simultaneous Equations	Theoretical lectures in class	HW & Exam
1413-	6	Physical and engineering application on first order D.E	Application on D.E	Theoretical lectures in class	HW & Exam
15	3	Solution of the D.E with variation of parameters	Solution of the D.E		HW & Exam

11. Course Evaluation

Evaluation type	Degree
2 quizzes	12
2 homework	8
Term exam	20
Final exam	60
Total	100

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	• -------------------
Main references (sources)	• Peter V. ONeil Advanced Engineering Mathematics_ 7th Edition • S.I. Hayek-Advanced Mathematical Methods in Science and Engineering-CRC Press_ Marcel Dekker (2000)
Recommended books and references (scientific journals, reports…)	--------------
Electronic References, Websites	--------------

Course Description Form

25. Course Name:
Hydraulic

26. Course Code:
DWR 341

27. Semester / Year:
First/ 2024-2025

28. Description Preparation Date:
1/6/2023

29. Available Attendance Forms:
Theoretical lectures in class.

30. Number of Credit Hours (Total) / Number of Units (Total)
30 hours/ 2

31. Course administrator's name (mention all, if more than one name)
Name: Dr. Mena Ahmed Alsawaf, Email: m.alsawaf@uomosul.edu.iq

32. Course Objectives	
Course Objectives	• Recognize the common types of flow in pipes • Apply the basic concepts of sciences and engineering to solve issues associated with the flow in pipes • Formulate the main parameter to design a model related to flow of water • Develop and solve design problems and analyze the data to evaluate the pipes used in supply system • Identify and analyze the solution of a problem occurs in flow over a hydraulic structure

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

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

34. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Recognize how to create a model (physical or numerical) and select the relevant variables.	Dimensionless analysis	Lecture in class	HW & Quiz
2	2	Understand the flow in pipes and their types and what are their application.	Modelling in pipes and open channel	Lecture in class	HW & Quiz
3	2	Understand the flow in pipes and their types and what are their application.	Flow in pipes, general equations	Lecture in class	HW & Quiz
4	2	Understand the flow in pipes and their types and what are their application.	Laminar and turbulent flow in pipes	Lecture in class	HW & Quiz
5	2	Summarize what is meant by a shear stress in pipes, friction force.	Distribution of velocities and shear stress in pipes	Lecture in class	HW & Quiz
6	2	Understand the flow in pipes and their types and what are their application.	Flow in smooth pipes, seventh root law	Lecture in class	HW & Quiz
7	2	Understand the flow in pipes and their types and what are their application.	Flow in rough pipes	Lecture in class	HW & Quiz
8	2	Understand the flow in pipes and their types and what are their application.	Classification of rough and smooth flow in pipes	Lecture in class	HW & Quiz
9	2	Discuss the usage of non-circular pipes and how to deal with them theoretically.	Flow in non-circular pipes	Lecture in class	HW & Quiz
10	2	Describe the different types of fitting added to the system of water supply.	Minor losses of the fittings, flow in orifice and syphon	Lecture in class	HW & Quiz
11	2	Define the connection between pipes and how to deal with them hydraulically, in term of parallel, series and branched.	Connect pipes in parallel and series	Lecture in class	HW & Quiz
12	2	Define the connection between pipes and how to deal with them hydraulically, in term of parallel, series and branched.	Branched channel, connection with tanks	Lecture in class	HW & Quiz
13	2	Identify the basic of designing the network of water supply system.	Hardy- cross method to measure discharge in each pipe of a networks	Lecture in class	HW & Quiz
14	2	Discuss the various properties and types of pumps.	Pumps: introduction, connections and efficiency	Lecture in class	HW & Quiz

15	2	Explain the connection of pumps to a system.	Pumps in parallel and series	Lecture in class	HW & Quiz

35. Course Evaluation

Evaluation type	Degree
3 quizzes	15
5 homework	10
Term exam	15
Final exam	60
Total	100

36. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Vennard, J.K., 1963. Elementary fluid mechanics. 4th edition.
Main references (sources)	Rajput, R.K., 2004. *A textbook of fluid mechanics and hydraulic machines*. S. Chand Publishing.
Recommended books and references (scientific journals, reports…)	-------
Electronic References, Websites	https://www.coursera.org/browse/physical-science-and-engineering

Course Description Form

1. Course Name:
Surface Hydrology
2. Course Code:
DWRE 342
3. Semester / Year:
2/2024−2025
4. Description Preparation Date:
1/9/2023
5. Available Attendance Forms:
Theoretical lectures in class
6. Number of Credit Hours (Total) / Number of Units (Total)
2/2
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Saleh Mohammed Saleh   Email: s.zakaria@uomosul.edu.iq

8. Course Objectives

Course Objectives	The aim of this course is to introduce the students to the area of hydrology. The course will cover the principles of the hydrology focusing on the introduction to the Hydrology, Climate Factors, Precipitation, Abstraction from Precipitation, Stream flow Measurement, Run-Off Hydrograph , and Flood Routing. At the end of the course the students will have good knowledge about the hydrologic events and have the skills to deal with a complete process and analysis of the hydrologic events. This will be achieved through descriptive lectures and supervised tutorials

9. Teaching and Learning Strategies

Strategy	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises in addition lectures, individual & group assignments, and e-learning platforms, while at the same time refining and expanding their critical thinking skills. Exercises involving the use of hydrological vocabulary and components to understand the engineering hydrological processes. The course will be taught in Arabic , and all mandatory assignments have to be submitted within the deadlines to be admitted to the exams. This will be achieved through classes, interactive tutorials and by considering some challenging problems to motivate student

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Knowing the types and Nature of hydrological data and symbols to understand the engineering hydrological processes.	Introduction; syllabus; Definition of hydrology, branch of Hydrology, hydrological cycle, Hydrological Budge Equation ، Engineering Hydrology Application, Typical Failure Factors for Hydraulic Installations, Source of Data.	Theoretical lecture in class	HW
2 - 3	2	hydrological analysis using Climate Factors	Introduction, Climate Factors, Temperature, Solar Radiation, Evaporation, Humidity, Vapor Pressure, and Wind.	Theoretical lecture in class	HW
4-5	2	Estimating of Total solar energy gained, Total solar energy loss, reflection, and dispersion, Estimating Saturation Deficit, Relative Humidity, Wind Speed	Introduction of Precipitation , Forms of Precipitation, Rain, Snow, Drizzle, Glaze, Sleet, Hail, Measurement of precipitation, Types of rain gauge, Errors in rainfall measurement, Precipitation Gage Network, adequacy of rain measurement stations, Preperation of data, Methods for calculating missing	Theoretical lectures in class	H W & Exam

			information, Test for Consistency of Records,		
6	2	Estimating of the Precipitation, (Arithmetic Mean Method, Thiessen Average Method, Isohyet Line Method).	Average Precipitation over Area, Arithmetic Mean Method, Thiessen Average Method, Isohyet LineMethod, Rainfall Data-show Methods, Accumulated Rainfall, Hyetograph, Rainfall Intensity, Probable Maximum Precipitation, Point Rainfall, Depth- area-duration –Relationship, Depth-Area-Duration, Intensity –Duration – Return period relation.	Theoretical lectures in class	HW
7-8	2	Knowing the Abstraction and losses from Precipitation from , and Knowing Types of evaporation meters, Class A. Estimating Empirical Evaporation Equations	Abstraction from Precipitation including precipitation, Evaporation, Evaporimeter, Types of evaporation meters, Class A Evaporation Pan, Pan Coefficien, Evaporation Measurement Stations, Empirical Evaporation Equations, Analytical methods for estimating, Types of evaporation meters, reducing evaporation from tanks.	Theoretical lectures in class	Quizzes & HW
9-10	2	Knowing and Estimating the Potential Evapotranspiration. Measurement of Infiltration, Infiltration Capacity Values, Estimating Infiltration Indices.	Evapotranspiration, Potential Evapotranspiration Equations, Infiltration, Measurement of Infiltration, Infiltration Capacity Values, Infiltration Indices	Theoretical lectures in class	HW1 HW2
11	2	Knowing the Water stage	Introduction, Stage or Water stage, time curve-Stage , Stream flow measurement, Measurement of velocity, Calibration, Equalization of the current meter device,	Theoretical lectures in class	Midterm Exam
12-14	2	Analysis Hydrological problems, Estimating Runoff Hydrograph	Hydrograph, Over land Flow or Surface Runoff, Inter Flow, Base Flow or Ground Water Flow, Hydrograph component, Factors affecting flood	Theoretical lectures in class	HW1 HW2

			hydrograph, Direct Runoff or Surface Flow (D.R.O.), Base Flow (B.F.) , Base Flow Separation, Effective Rain, Unit Hydrograph, Unit Hydrograph Assumptions, Unit Hydrograph Derivation, Unit Hydrograph for Different Duration		
15	2	Applying the Routing method for hygrological storage and channel.	Flood Routing, Hydrologic Storage Routing, Hydrologic Channel Routing.	Theoretical lectures in class	HW

11. Course Evaluation

Evaluation type	Degree
Quizzes	10
Assignment (HW) (each 1 pt)	10
Midterm Exam	20
Final Exam	60
Total	100

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	• الهيدرولوجيا الهندسية / محمد سليمان حسن. باسل خضر داوود ، ساطع محمود الراوي، وزارة التعليم العالي والبحث العلمي- جامعة الموصل، • K. Subramana, "ENGINEERING HYDROLOGY", Second Edition Mc Graw hill, New Delhi, 1997.
Main references (sources)	• Linsely, R.K., M.A.Kohlerand Paulhus. "HYDROLOGY OF ENGINEERING", McGraw-Hill, Singapore, 1988. • Ward, R.C & Robinson, "PRINCIPLES OF HYDROLOGY",. Mc Graw-Hill.London.1990.
Recommended books and references (scientific journals, reports…)	--------------
Electronic References, Websites	--------------

Course Description Form

1. Course Name:
Irrigation principles and practices

	2. Course Code:
	DWR 343
	3. Semester / Year:
	Second Semester/2024−2025
	4. Description Preparation Date:
	1/9/2023
	5. Available Attendance Forms:
	Theoretical lectures in class
	6. Number of Credit Hours (Total) / Number of Units (Total)
	2hour*15 week/2 units
	7. Course administrator's name (mention all, if more than one name)
	Dr. Anmar Abdulaziz AL-Talib anmar.altalib@uomosul.edu.iq
	Alaa ismail naser engalaaismail79@uomosul.edu.iq

8. Course Objectives

Course Objectives	The course aims to introduce the student to the principles and foundations of irrigation, its operations, methods, and matters related to it

9. Teaching and Learning Strategies

Strategy	The course Irrigation principles and practices teaches students many useful things in the future in designing and understanding the basic principles of irrigation. After completing this course, students are expected to be familiar with the following points: 1. Definition of irrigation, its purpose and benefits. 2. Identify and store irrigation sources. 3. Basic relationships between soil and water. 4. Safe drainage from groundwater reservoirs. 5. The feasibility of developing underground reservoirs and the changes that occur in them. 6. Learn about ground moisture measurements and how to calculate the amounts of water stored in the soil. 7. Identify the characteristics of water entering the soil.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Irrigation in the world - irrigation since ancient times - dry areas in the world - definition of irrigation - precipitation -	Introducing the student to irrigation in general	Lecture	

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

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

15	2	Monthly exam(3)		

11. Course Evaluation

Evaluation type	Degree
Quizzes	10%
Home works	5%
Term exam	25%
Final exam	60%
Total	100%

12. Learning and Teaching Resources

Required textbooks (curricular book, if any)	• Irrigation principles and practices , by V.E. Hansen ,O.W.Israelsenand G.F. Stringham, fourth edition, john wiley and sons., 1980.
Main references (sources)	• Crop water requirements (FAO – 24 • -Crop evapotranspiration –guide lines for computing crop water requirements (FAO – 56) • Design manual for irrigation &drainage- ministry of irrigation-Iraq (pencol),1980
Recommended books and references (scientific journals, reports…)	---------------
Electronic References, Websites	https://classroom.google.com/c/NjI3MjYzMzQzNDc1

Course Description Form

1. Course Name:
Theory of Structures I

2. Course Code:
DWR 344

3. Semester / Year:
Fall / 2024-2025

4. Description Preparation Date:
1/9/2023

5. Available Attendance Forms:
Theoretical lectures in class

6. Number of Credit Hours (Total) / Number of Units (Total)
3/2

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

Name: Dr. Mohammed Mukhlif Khalaf
Email: mohammedmukhlifkhalaf@uomosul.edu.iq

8. Course Objectives

Course Objectives	On successful completion of this course students will be able to: 1. Find out stability and determinacy of structures, (i) 2. Analyze the statically determinate beams, (i) 3. Analyze the statically determinate frames, (i) 4. Analyze the statically determinate trusses, (i) 5. Evaluate the elastic deformation of structures by virtual work (unit load) method, (iii) 6. Evaluate the elastic deformation of structures by Castigliano`s first theorem method, (iii)

9. Teaching and Learning Strategies

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

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Determine the stability and determinacy of structures	Stability and determinacy of structures	Theoretical lectures in class	
2-3	6	Analyze of the statically determinate beams	Analysis of the statically determinate structures	Theoretical lectures in class	
4-5	6	Analyze of the statically determinate frames	Analysis of the statically determinate structures	Theoretical lectures in class	H.W
6-7	6	Analyze of the statically determinate trusses	Analysis of the statically determinate structures	Theoretical lectures in class	Exam
8	3	Determine the elastic deformation of beams by virtual work (unit load) method	The elastic deformation of structures by virtual work (unit load) method	Theoretical lectures in class	

9	3	Determine the elastic deformation of frames by virtual work (unit load) method	The elastic deformation of structures by virtual work (unit load) method	Theoretical lectures in class	H.W
10-11	6	Determine the elastic deformation of trusses by virtual work (unit load) method	The elastic deformation of structures by virtual work (unit load) method	Theoretical lectures in class	Exam
12	3	Determine the elastic deformation of beams by Castigliano`s first theorem method	The elastic deformation of structures by Castigliano`s first theorem method	Theoretical lectures in class	
13	3	Determine the elastic deformation of frames by Castigliano`s first theorem method	The elastic deformation of structures by Castigliano`s first theorem method	Theoretical lectures in class	H.W
14-15	6	Determine the elastic deformation of trusses by Castigliano`s first theorem method	The elastic deformation of structures by Castigliano`s first theorem method	Theoretical lectures in class	Exam

11. Course Evaluation

Quizzes	6pt
Homeworks	4pt
Term exams	30pt
Final Exam	60pt
Total	100pt

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Elementary Theory of Structures, YUAN-YU HSIEH, PRETICE-HALL, 1980.
Main references (sources)	Hibbeler R. C. (2012). Structural analysis (8th ed.). Pearson/Prentice Hall.
Recommended books and references (scientific journals, reports…)	--------------
Electronic References, Websites	--------------

Course Description Form

1. Course Name:
Concrete Design
2. Course Code:
DWR 345
3. Semester / Year:
2/2024-2025

	4. Description Preparation Date:				

1/9/2023

	5. Available Attendance Forms:				

Theoretical lectures in class

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

2/2

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

Name: Dr. Saddam M. AHMED   Email: ahmed.saddam@uomosul.edu.iq

8. Course Objectives

Course Objectives	In DWRE 345, initially students will learn how to analysis and design reinforced concrete elements. Upon successful completion of this course the student shall be able to assess the: 1. Mechanical properties of concrete, and reinforcements, (i) 2. Safety and serviceability provision, (i) 3. Behavior of reinforced concrete at working and ultimate loads, (i) 4. Analysis and Design of simple beams and slabs by working stress method, (ii) 5. Analysis and Design of simple beams and slabs by ultimate strength design method, (ii) 6. Analysis and design of T beam, Doubly reinforced beam and continuous beams by Ultimate strength design method (USD), (ii) 7. Shear strength in beams and design of shear reinforcement, (ii)

9. Teaching and Learning Strategies

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

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1 and 2	4	Introduction; syllabus; Advantages and Disadvantages of Reinforced Concrete as a Structural Material; Mechanical properties of concrete; steel. Concrete and steel grading; design philosophy; Loading types.	General introduction on reinforced concrete	Theoretical lectures in class	Exam1
3 and 4	4	Introduction, Flexural Analysis of Beams (working): Cracking Moment; Elastic Stresses—Concrete Cracked	Principles flexible and uncrack section	Theoretical lectures in class	Exam1
5	2	Introduction, Flexural Analysis of Beams (Ultimate): Ultimate Moment; Yield Stresses	Principles of crack section	Theoretical lectures in class	Exam2
6 and 7	4	Strength Analysis of Beams According to ACI Code: Design Methods; Strains in Flexural Members; Balanced	Principles of ultimate load	Theoretical lectures in class	Exam2

		Sections, Tension-Controlled Sections, and Compression-Controlled	carrying capacity		
8 and 9	4	Design of Rectangular Beams and One-Way Slabs: Load Factors; Design of Rectangular Beams; One-Way Slabs	Design beam and one way slabs	Theoretical lectures in class	Exam2
10,11 and 12	6	Analysis and Design of T Beams and Doubly Reinforced Beams: T Beams; Design of Doubly Reinforced Beams (positive and Negative Moment design); L-Shaped Beams	Design T-beam	Theoretical lectures in class	Exam3
13 and 14	4	Shear and Diagonal Tension: Shear Stresses in Concrete Beams; Design for Shear.	Principle of shear strength	Theoretical lectures in class	Exam3

11. Course Evaluation

Evaluation type	Degree
Three exam (Best two will consider)	40
Final exam	60
Total	100

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	• Jack M., Russell B. (2012) "DESIGN OF REINFORCED CONCRETE", nine Edition, Wiley, ISBN: 978-1-118-12984-5, USA. (can be downloaded from the Course web page).
Main references (sources)	• Gillesania, D.I.T. "FUNDAMENTALS OF CONCRETE DESIGN". Phils. DIT Gillesania, 2003. (can be downloaded from the Course web page).
Recommended books and references (scientific journals, reports…)	--------------
Electronic References, Websites	--------------

Course Description Form

1. Course Name:
Soil Mechanics-I
2. Course Code:

DWR 346

3. Semester / Year:

Fall semester (first) / 2023 -2024

4. Description Preparation Date:

1/9/2023

5. Available Attendance Forms:

Class lectures + Lab. lectures

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

45 hours/ 3 credits

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

Name: Dr. Zuheir Karabash   Email: karabash@uomosul.edu.iq

    I. M. A. Al-kiki   Email: i.alkiki@uomosul.edu.iq

8. Course Objectives

Course Objectives	The objective of the soil mechanics-I course is to introduce the subject of geotechnical engineering. In this course, the student will understand and be familiar with important topics: type of the soils and their origins, index, and physical and engineering properties of soils, soil structure and grain size, classifications of soils for engineering purposes, permeability of the soil, soil stresses, and seepage through the soil, Upon completion of the soil mechanics course, students should be able to apply principles of soil mechanics and in the analysis, design, and construction of civil engineering projects.

9. Teaching and Learning Strategies

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

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	**Definition of the soil types and origin**	**Introduction, types of the soil, soil origin, and formation.**	**Lecture in class**	**Class discussions**
2+3	6	**Explaining the physical properties of the soil**	**Physical properties of the soil, weight-volume relationships soil structures.**	**Lecture in class**	**Quiz**

4	3	**Learn the soil water content and Gs determination**	**Lecture and Water content and GS tests**	**In Lab.**	**Report**
5	3	**Knowing the soil consistency and Atterberg's limits**	**Soil plasticity and Atterberg limits, clay mineralogy.**	**Lecture in class**	**Quiz**
6	3	**Learn the soil classification systems**	**Soil classification.**	**Lecture in class**	**Class discussions**
7	3	**Learn Atterberg's limits tests**	**Lecture, Atterberg's limits**	**In Lab.**	**Report**
8	3	**Learn the permeability of the soil**	**Permeability of soils, Darcy's law, and soil coefficient of permeability.**	**Lecture in class**	**Course examination No.1**
9	3	**Learn How to estimate soil grain size distributions**	**Lecture and grain size distribution tests test.**	**In Lab.**	**Report**
10+11	3	**Knowledge stresses in the soil**	**Total and effective stresses and stresses due to external loads.**	**Lecture in class**	**Homework assignment**
12	3	**Learn about the permeability tests**	**Lecture and permeability test**	**In Lab.**	**Report**
13-15	9	**Knowledge of seepage of water through soils**	**Seepage of the water through the earth dams.**	**Lecture in class**	**Quiz and Course Examination No.2**

11. Course Evaluation

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

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	o Al-Asho, M. O "Soil Mechanics Principles", 1990 Student textbook, University of Mosul.
Main references (sources)	o - Das, B.M. and Sobhan, K. "Principle of Geotechnical Engineering", Ninth Edition, Cengage Learning. o Coduto, D.P. "Geotechnical Engineering Principle and practices", 1999, Prentice-Hall, Inc.

Recommended books and references (scientific journals, reports…)	1. Al-Rafidain Engineering Journal. 2. Highway Research Record , H R R. 3. Journal of the Geo technical engineering Division , ASCE. 4. Journal of Soil Mechanics and Foundation Division, Proc. ASCE. 5. Transportation Research Record , TRR. 6. Journal of the Japan Society of Civil Engineering , JSCE.
Electronic References, Websites	None

Course Description Form

1. Course Name:
Computer Applications in Water Resources I
2. Course Code:
DWR 347
3. Semester / Year:
First / 2024−2025
4. Description Preparation Date:
1−6−2023
5. Available Attendance Forms:
Theoretical & Experimental lectures in lab.
6. Number of Credit Hours (Total) / Number of Units (Total)
90 hours/ 2 units
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Rasha M. Sami   Email: rasha.fadhil@uomosul.edu.iq Name: Dr. Talal Ahmed Basheer   Email: t.basheer@uomosul.edu.iq Name: Mohammed Awni Khattab   Email: m.almukhttar@uomosul.edu.iq
8. Course Objectives

Course Objectives	In this course, initially students will learn Important and useful information about applications that covers modern programs related to the subject of water resources in all aspects. Upon successful completion of this semester the student shall be able to understand and use some of computer application to analysis data and solving engineering problems.

9. Teaching and Learning Strategies
Strategy	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes,

interactive tutorials and by considering some challenging problems to motivate students.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Introduction to Applications used in Water Resources	Introduction to Computer Applications in Water Resources	A lecture in the la	CW
2	3	Learning to use Microsoft Excel	Getting Started with Excel Essentials	A lecture in the la	CW & HW
3	3	Learning to use Microsoft Excel (continued)	Organizing and Enhancing Excel Worksheets	A lecture in the lab	CW
4	3	Learning to use Microsoft Excel (continued)	Creating Formulas and Charting Data in Excel	A lecture in the lab	CW & HW
5-6	6	Solving engineering problems in Excel	Exercises of an engineering and practical nature in Excel.	A lecture in the lab	CW & Exam
7	3	Learning to use SPSS	SPSS program	A lecture in the lab	CW
8	3	Learning to use SPSS (continued)	SPSS program	A lecture in the lab	CW & Exam
9	3	Introduction to Applications used in Water Resources	Visual Basic Application	A lecture in the lab	CW & Exam
10	3	Record Macro Code methodology	Visual Basic Application	A lecture in the lab	CW & Exam
11	3	Variables types Design Mode	Visual Basic Application	A lecture in the lab	CW & Exam
12	3	Explanation of -FOR and NEXT Instruction -And -Or instruction	Visual Basic Application	A lecture in the lab	CW & Exam
13	3	Explanation of If If -else If -else if -else End if	Visual Basic Application	A lecture in the lab	CW & Exam
14	3	Writing mathematical code	Visual Basic Application	A lecture in the lab	CW & Exam
15			Term Exam		

11. Course Evaluation

Evaluation type	Degree
Quizzes	20
Classwork	10
Term exam	20
Final exam	50
Total	100

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Morrison, C., Wells, D., & Ruffolo, L. (2014). Computer literacy basics: A comprehensive guide to IC3. Cengage Learning.
Main references (sources)	Landau, S., & Everitt, B. S. (2017). A handbook of statistical analyses using SPSS.
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	Google classroom

Course Description Form

1. Course Name:
Statistical Methods in Hydrology
2. Course Code:
DWR 394
3. Semester / Year:
First / 2024-2025
4. Description Preparation Date:
1/9/2023
5. Available Attendance Forms:
Theoretical lectures in class.
6. Number of Credit Hours (Total) / Number of Units (Total)
2/2
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Muhanad Talal Yousif Email: mohanad_alsheer@uomosul.edu.iq
8. Course Objectives

Course Objectives	- Analysis of hydrological data - Representation and graphical of hydrological data - Used the descriptive statistics for hydrological data - Understand the meaning of probability theory - Application the regression analysis and correlation on

	hydrological data

9. Teaching and Learning Strategies

Strategy	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, by considering type of exercises involving some problems that are interesting to the students in mathematics scope in a field of dams and water resources engineering.

10. Course Structure

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

13-15	6	Application the regression analysis and correlation on hydrological data	Regression Analysis; Simple Linear Regression (SLR) and Curvilinear Regression; Model Transformable to Linear Regression, Correlation and Coefficient of Determination	A lecture in class	H.W, C.W and Exam

11. Course Evaluation

Evaluation type	Degree
3 Exam	30
3 homework	6
2 classwork	4
Final exam	60
Total	100

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	"Statistical Analysis of Hydrologic Variables". Ramesh S.V. Teegavarapu, Jose D. Salas and Jery R. Stedinger. Published by the American Society of Civil Engineers, 2019
Main references (sources)	• "Statistical Methods in Hydrology and Hydroclimatology". Rajib Maity. Springer Transactions in Civil and Environmental Engineering. 2018 • "Hydrologic Probability and Statistics". Joseph V. Bellini. PDH online Course H142. 2012.

Recommended books and references (scientific journals, reports…)	_____
Electronic References, Websites	_____

Course Description Form

37.	Course Name:
English– intermediate level	

38.	Course Code:
_____	

39.	Semester / Year:
2/2024–2025	

40.	Description Preparation Date:
15/1/2024	

41.Available Attendance Forms:
Theoretical lectures in class

42.Number of Credit Hours (Total) / Number of Units (Total)
2/2

43.	Course administrator's name (mention all, if more than one name)
Name: Asst. Lec. Ali Yousif Mohammed Email: ali.yousif@uomosul.edu.iq	

44.	Course Objectives
Course Objectives	The main objectives of delivering the course " English- Intermediate Level" is to: • Understand the structure of the sentence in English and its components and formation. • Learn the form and the function of the English tenses for scientific writings including the present simple and the present continues as well as coming across exercises related to tenses. • Cultivate students' skills through reading comprehension of scientific texts related to their specialty. • Become familiar with English terms utilized in the study of Dams and Water Engineering. • Develop understanding of the translation of some terms into Arabic.

		• Develop students' professional communication through being engaged in scientific focus groups discussions and questions/answer exchanges.

45. Teaching and Learning Strategies

Strategy	
	The teaching strategy followed in this course is communicative. It encourages the students for active engagement and group participation. It also helps the students to learn and be familiar with scientific English that is related to their specialization in the Dams and Water Resources Engineering in accordance with English for Specific Purposes. Feedback-based mechanism is also utilized to support students' linguistic capacity.

46. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Introduction to the sentence structure in English	Sentence structure	Theoretical lectures in class	Quizzes and exams
2	2	Learn about tenses in English	The present simple	Theoretical lectures in class	Quizzes and exams
3	2	Learn about tenses in English	Exercise activities	Theoretical lectures in class	Quizzes and exams
4	2	Learn about tenses in English	The present continuous	Theoretical lectures in class	Quizzes and exams
5	2	Learn about tenses in English	Exercise activity	Theoretical lectures in class	Quizzes and exams
6	2	Transfer sentences from active into passive	Passive voice	Theoretical lectures in class	Quizzes and exams
7	2	Practical application of explained tenses and passive voice	Reading comprehension	Theoretical lectures in class	Quizzes and exams
8	2	Become familiar with English for specific purposes and scientific terms	Introducing scientific English	Theoretical lectures in class	Quizzes and exams

9	2	Developing understanding of scientific English in terms of vocabularies, structure, and translation.	scientific texts 1	Theoretical lectures in class	Quizzes and exams
10	2	Developing understanding of scientific English in terms of vocabularies, structure and translation.	scientific texts 2	Theoretical lectures in class	Quizzes and exams
11		Developing understanding of scientific English in terms of vocabularies, structure and translation.	scientific texts 3	Theoretical lectures in class	Quizzes and exams
12		Developing understanding of scientific English in terms of vocabularies, structure and translation.	scientific texts 4	Theoretical lectures in class	Quizzes and exams
13		Developing understanding of scientific English in terms of vocabularies, structure and translation.	scientific texts 5	Theoretical lectures in class	Quizzes and exams
14		Developing understanding of scientific English in terms of vocabularies, structure and translation.	scientific texts 6	Theoretical lectures in class	Quizzes and exams
15		Developing understanding of scientific English in terms of vocabularies, structure, and translation.	scientific texts 7	Theoretical lectures in class	Quizzes and exams

47. Course Evaluation

Evaluation type	Degree
Quizzes (1)	10
homework	0
Term exam	30
Final exam	60
Total	100

48. Learning and Teaching Resources

Required textbooks (curricular books, if any)	--------------------
Main references (sources)	• Soars, John & Soras, Liz (2019) *New Headway (4th ed).* Oxford University Press
Recommended books and references (scientific journals, reports…)	--------------
Electronic References, Websites	• Al Nasiri Nadhir, etal. (2021) Mosul Dam Problem and Stability. *Engineering. 13*(3). DOI 10.4236/eng.2021.133009. .http// scirp.com • Fanak Water (2022, December 6) W*ater quality in Iraq,* http//water.fanack.com • The Editors of Britannica (2024, April 13). *Groundwater Hydrology.* Britannica*.* http//"britannica.com.

Course Description Form

13. Course Name:
Numerical Analysis
14. Course Code:
DWR 320
15. Semester / Year:
2/2024-2025
16. Description Preparation Date:
1/9/2023
17. Available Attendance Forms:
Theoretical lectures in class
18. Number of Credit Hours (Total) / Number of Units (Total)

3/2

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

Ali Ahmed Abdulhadi   Email: aliabdulmawjood@uomosul.edu.iq

20. Course Objectives

Course Objectives	The primary aims of this course are to: • Familiarize students with numerical methods for solving complex mathematical problems, including numerical integration, differentiation, and the solutions of differential equations. (i) • Equip students with the skills necessary to obtain accurate numerical solutions to mathematical problems that cannot be solved analytically. Students will develop the ability to analyze and minimize errors and approximations inherent in these methods. (i) • Educate students about common sources of error and approximation in numerical methods, including truncation error, rounding error, and discretization error. (i) • Provide students with mastery over the techniques for solving equations in one variable, including the bisection method, secant method, Newton-Raphson method, and fixed-point iteration method. After taking the course. (ii) • Allow students to develop a deep understanding of the available methods for solving simultaneous equations(ii)

21. Teaching and Learning Strategies

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

22. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Numerical Methods: Iteration and graphical method	Numerical Solution of Algebraic Equations	Theoretical lectures in class	HW & Exam
1	3	Bisection method	Numerical Solution of Algebraic Equations		HW & Exam
1	3	False position method	Numerical Solution of Algebraic Equations	Theoretical lectures in class	HW & Exam
1	3	Newton-Raphson's method	Numerical Solution of Algebraic Equations	Theoretical lectures in class	HW & Exam
1	3	Maclaurin series	Numerical Series	Theoretical lectures in class	HW & Exam
4	12	Taylor's series	Numerical Series	Theoretical lectures in class	HW & Exam
2	6	Euler's method	Numerical Series		HW & Exam
2	6	Runge's -Kutta method	Solution of D.E.	Theoretical lectures in class	HW & Exam

2	6	Interpolation:Greagory Newton forward interpolation method	Interpolation	Theoretical lectures in class	HW & Exam

23. Course Evaluation

Evaluation type	Degree
2 quizzes	12
2 homework	8
Term exam	20
Final exam	60
Total	100

24. Learning and Teaching Resources

Required textbooks (curricular books, if any)	• --------------------
Main references (sources)	• Burden_Numerical_Analysis_5e_(PWS,_1993) • Fundamental Numerical Methods and Data Analysis
Recommended books and references (scientific journals, reports…)	--------------
Electronic References, Websites	--------------

Course Description Form

1. Course Name:	
Open Channels and Hydraulic Machines	
2. Course Code:	
DWR 348	
3. Semester / Year:	
First 2024-2025	
4. Description Preparation Date:	
9/4/2024	
5. Available Attendance Forms:	
Lectures and Tutorials	
6. Number of Credit Hours (Total) / Number of Units (Total)	
2 hr/2 cridits	
7. Course administrator's name (mention all, if more than one name)	
Name: Ahmed Y. Mohammed Email: a.altaee@uomosul.edu.iq	

8. Course Objectives

Course Objectives	On successful completion of this course students will be able to: 1. Recognize the common physical phenomenon of flow in open channel 2. Classify the type of flow and the properties for each type, with the common empirical equations 3. Define the specific energy of the flow in open channel and connect that with practical cases that happen in reality 4. Route the curve of surface water profile when there is a structure in open channel • Recognize the main typed of pumps used in water resources engineering and how connect each other and define the main requirements to design the right one

9. Teaching and Learning Strategies

Strategy	The strategy is to provide theoretical lectures using presentatio and question solving in an interactive way with students insid the classroom, as well as tutorials exercises.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Open channel, types and classifications.	Open channel, typ and classifications	Presentation And white board	Monthly exam
2	2	Uniform flow, Chezy and I equations.	Uniform flow, Ch and Mann equations.	Presentation And white board	Monthly exam
3	2	Best hydraulic cross sect	Best hydraulic cr section	Presentation And white board	Monthly exam
4&5	4	Consecration of hydrauli and Manning coefficier	Consecration hydraulic radius a Manning coefficier	Presentation And white board	Monthly exam
6	2	Specific energy and critic	Specific energy critical depth.	Presentation And white board	Monthly Exam
7	2	First monthly exam			
8&9	4	Critical depth with hu contractions	Critical depth with or contractions	Presentation And white board	Monthly Exam
10	2	Hydraulic jump	Hydraulic jump	white board	Monthly Exam
11	2	Varied flow	Varied flow	white board	Monthly Exam
12	2	water surface profile	water surface pro	white board	Monthly Exam
13	2	Weirs and notches	Weirs and notches	white board	Monthly Exam

14	2	Second monthly exam
15	2	Preparatory week before the final Exam

11. Course Evaluation

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

12. Learning and Teaching Resources

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

Course Description Form

13. Course Name:
Groundwater Hydrology

14. Course Code:
DWR 349

15. Semester / Year:
2/2024−2025

16. Description Preparation Date:
1/9/2023

17. Available Attendance Forms:
Theoretical lectures in class

18. Number of Credit Hours (Total) / Number of Units (Total)
2/2

19. Course administrator's name (mention all, if more than one name)
Name: Dr. Rasha M.Sami Fadhil   Email: Rasha.Fadhil@uomosul.edu.iq

20. Course Objectives	
Course Objectives	10.The groundwater hydrology course is concerned with studying the movement of water in various groundwater reservoirs. After completing

the course, the student will be knowledgeable about the following points:

11. • The student's knowledge of the importance of groundwater hydrology. (i)

12. • The student should be able to understand the movement of groundwater and its flow inside wells. (ii)

13. • The student should be able to describe the hydraulic characteristics of groundwater reservoirs. (i)

14. • Knowledge of the fundamental laws and equations to describe groundwater flow processes.(ii)

15. • General knowledge of the types and characteristics of groundwater aquifers.(i)

16. • The student could be able to use software related to groundwater movement (i)

21.   Teaching and Learning Strategies

Strategy	The primary strategy to be adopted in delivering this course is to encourage students' participation in the exercises, while at the same time improving and expanding their critical thinking skills. This will be achieved through interactive classroom and educational programs and by looking at some issues to motivate students.

22. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	General Introduction - What is groundwater? Groundwater and the water cycle, aquifers, the importance of groundwater, groundwater scenario (i)	A general introduction to groundwater hydrology	Theoretical lectures in class	Exam
3-2	4	Aquifer characteristics, types of aquifers, confined aquifer Unconfined aquifer, percolating aquifer, perched aquifer Characteristics of aquifers, porosity, specific yield, permeability coefficient. (i)	Definitions and terms	Theoretical lectures in class	Exam
5-4	4	Laws of groundwater movement: Darcy's law, hydraulic conductivity, transmissibility. (ii)	Groundwater movement	Theoretical lectures in class	Exam
7-6	4	Groundwater flow from wells for steady flow: analysis of steady groundwater flow, and steady flow in confined and unconfined aquifers (ii)	Groundwater flow from wells for steady flow	Theoretical lectures in class	Exam
8	2	Monthly exam			
11-9	6	Groundwater flow from wells for unsteady flow: analysis of unsteady groundwater flow, and unsteady flow in confined and unconfined aquifers (ii)	Groundwater flow from wells for unsteady flow	Theoretical lectures in class	Exam
13-12	4	Well hydraulics, well withdrawal, and steady flow to confined flow in the well - unconfined + introducing the student to programs for groundwater hydrology (ii)	Well hydraulics	Theoretical lectures in class	Exam
14	2	Well drilling - penetration speed, diameter, depth, and vibration level. (i)	Drilling wells	Theoretical lectures in class	Exam

15	2	Term exam

23. Course Evaluation

Evaluation type	Degree
Monthly exam	20
Term exam	20
Final exam	60
Total	100

24. Learning and Teaching Resources

Required textbooks (curricular books, if any)	--------------
Main references (sources)	- Groundwater hydrology (2005) by Todd,D.K., Mays, L. W. Wiley - Groundwater hydrology-Conceptual and computational Models (2003)by K.R.Rushton published by Wiley. - Engineering Hydrology-McGraw-Hill,2008
Recommended books and references (scientific journals, reports…)	--------------
Electronic References, Websites	https://ocw.mit.edu/courses/1-72-groundwater-hydrology-fall-2005/ https://ocw.mit.edu/courses/1-72-groundwater-hydrology-fall-2005/pages/lecture-notes/

Course Description Form

1. Course Name:
Drainage Engineering
2. Course Code:
DWR 350
3. Semester / Year:
2/2024−2025
4. Description Preparation Date:
1/9/2023
5. Available Attendance Forms:
Theoretical lectures in class

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

2/2

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

Name: Dr. Ahmed A. M. Al-Ogaidi Email: a.alogaidi@uomosul.edu.iq
Name: Mohammed T. M.   Email: m.altaiee@uomosul.edu.iq
Name: Abdulazeez A. M.   Email: abdulazeez.mohammed@uomosul.edu.iq

8.	Course Objectives

Course Objectives	The Drainage Engineering course teaches students a lot of useful things in designing and understanding drainage networks. After completing this course, students are supposed to be familiar with the following points: 17. Definition of drainage, its purpose, evidence and benefits, as well as an overview of the history of drainage in Iraq. (i) 18. Learn the basics of groundwater movement by studying Darcy's law, Laplace's equation, and Dupuis-Forchheimer's equation. (i) 19. Learn about the reclamation of saline soils, salts removal, and the requirements for washing them. (i) 20. Learn the exploratory and design investigations of drainage projects. (ii) 21. Studying the various methods used to estimate the hydraulic conductivity of soils in the laboratory and field. (ii) 22. Identifying the different drainage systems through their types, planning their locations and depths, and designing filters. (i) 23. Learn the basics of designing surface (open) and subsurface (covered) drainage sections. (ii) 24. Designing the distances between the drains in the case of stable and unstable flow. (ii) 25. Identifying the vertical drainage (drainage wells). (ii) 26. Learn drainage maintenance. (ii) **27.** The relationship between drainage and environmental pollution. (i)

9.	Teaching and Learning Strategies

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

10.	Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Definition of drainage, its purpose, evidence and benefits, as well as an overview of the history of drainage in Iraq. (i)	General introduction on drainage of agricultural lands	Theoretical lectures in class	Exam
2-3	4	Learn the basics of groundwater movement by studying Darcy's law, Laplace's equation, and Dupuis-Forchheimer's equation. (i)	Principles of groundwater hydraulics	Theoretical lectures in class	HW & Exam
4-5	4	Learn about the reclamation of saline soils, salts removal, and the requirements for washing them. (i)	Reclamation of saline soils	Theoretical lectures in class	HW & Exam
6	2	Learn the exploratory and design investigations of drainage projects. (ii)	Drainage projects' investigations	Theoretical lectures in class	HW & Exam

7-8	4	Studying the various methods used to estimate the hydraulic conductivity of soils in the laboratory and field. (ii)	Estimation of soil hydraulic conductivity	Theoretical lectures in class	HW & Exam
9	2	Identifying the different drainage systems through their types, planning their locations and depths, and designing filters. (i)	Drainage systems	Theoretical lectures in class	HW & Exam
10	2	Learn the basics of designing surface (open) and subsurface (covered) drainage sections. (ii)	Design of drains' sections	Theoretical lectures in class	HW & Exam
11-13	6	Designing the distances between the drains in the case of stable and unstable flow. (ii)	Spacing between drains	Theoretical lectures in class	HW & Exam
14	2	Identifying the vertical drainage (drainage wells). (ii)	Vertical drainage (drainage wells)	Theoretical lectures in class	HW & Exam
15	2	Learn drainage maintenance. (ii) The relationship between drainage and environmental pollution. (i)	Drains' maintenance Drainage and water pollution	Theoretical lectures in class	Exam

11. Course Evaluation

Evaluation type	Degree
2 quizzes	12
2 homework	8
Term exam	20
Final exam	60
Total	100

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	• Al-Dabagh, Abdulsattar Younis, and Ali, Angham Ezz Al-Deen. *Drainage Engineering*. Dar Al-Kutob for Printing and Publishing, University of Mosul, Mosul, Iraq, 1992.
Main references (sources)	• Luthin, James N., and James N. Luthin. *Drainage engineering*. No. TC970 L8. New York: Wiley, 1973. • Waller, Peter, and Muluneh Yitayew. *Irrigation and drainage engineering*. Springer, 2015. • Al-Lamy, Muhsin M. A., and L-Janaby, Alaa', S. A. Drainage, investigations, designs, execution and maintenance. Dar Al-Kutob for Printing and Publishing, University of Mosul, Mosul, Iraq, 1991.
Recommended books and references (scientific journals, reports…)	--------------

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

Course Description Form

1. Course Name:
Soil Mechanics-II
2. Course Code:
DWR 351
3. Semester / Year:
Fall semester (first) / 2023 -2024
4. Description Preparation Date:
1/9/2023
5. Available Attendance Forms:
Class lectures + Lab. lectures
6. Number of Credit Hours (Total) / Number of Units (Total)
45 hours/ 3 credits
7. Course administrator's name (mention all, if more than one name)

Name: Dr. Zuheir Karabash   Email: karabash@uomosul.edu.iq

    I. M. A. Al-kiki   Email: i.alkiki@uomosul.edu.iq

8. Course Objectives

Course Objectives	The objective of the soil mechanics course is to introduce the subject of geotechnical engineering. In this course, the student will understand and be familiar with important topics: soil improvements, compaction, the compressibility of the soil, shear stress in soils, lateral earth pressure, and slope stability problems, Upon completion of the soil mechanics course, students should be able to apply principles of soil mechanics and in the analysis, design, and construction of civil engineering projects.

9. Teaching and Learning Strategies

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

10. Course Structure

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

1	3	**Definition the soil stabilization and modification**	**Soil stabilization and improvements. Soil stabilization techniques, Compaction**	**Lecture in class**	**Class discussions**
2	3	**Explaining the field compaction and field density**	**Field compaction, and soil field density**	**Lecture in class**	**Homework assignment**
3	3	**Learn the soil compaction test and specifications**	**Lecture and compaction test**	**In Lab.**	**Report**
4+5	6	**Knowing the consolidation theories and mechanism**	**Consolidation, mechanism of consolidation, consolidation test, and data analysis, presentation of consolidation test results.**	**Lecture in class**	**Quiz**
6	3	**Learn the consolidation rate and settlements**	**Rate of consolidation, and degree of consolidation.**	**Lecture in class**	**Class discussions**
7	3	**Learn the field density tests**	**Lecture and field density test**	**In Lab.**	**Report**
9 + 8	6	**Learn the shear strength of the soil**	**Shear strength, introduction, and shear strength components,**	**Lecture in class**	**Course examination No.1**
10	3	**Learn the consolidation test**	**Lecture and consolidation test.**	**In Lab.**	**Report**
11	3	**Knowledge of methods for soil shear strength**	**methods of shear strength determination**	**Lecture in class**	**Homework assignment**
12	3	**Learn about the shear tests**	**Lecture and shear tests**	**In Lab.**	**Report**
13	3	**Knowledge of Lateral earth pressure, Its theories and principles**	**Lateral earth pressure, types and theories, at-rest condition,**	**Lecture in class**	**Quiz**
14	3	**Knowledge of earth pressure determination methods**	**Rankine active and passive conditions, coulomb active and passive conditions.**	**Lecture in class**	**Homework assignment**
15	3	**Learn about the slope stability of the soil slopes.**	**Slope stability analysis, introduction,**	**Lecture in class**	**Course examination No.2**

			methods of slope stability analysis.		

11. Course Evaluation

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

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	o Al-Asho, M. O "Soil Mechanics Principles", 1990 Student textbook, University of Mosul.
Main references (sources)	o - Das, B.M. and Sobhan, K. "Principle of Geotechnical Engineering", ninth Edition, Cengage Learning. o Coduto, D.P. " Geotechnical Engineering Principle and practices", 1999, Prentice-Hall, Inc.
Recommended books and references (scientific journals, reports…)	7. Al-Rafidain Engineering Journal. 8. Highway Research Record , H R R. 9. Journal of the Geo technical engineering Division , ASCE. 10. Journal of Soil Mechanics and Foundation Division, Proc. ASCE. 11. Transportation Research Record , TRR. 12. Journal of the Japan Society of Civil Engineering , JSCE.
Electronic References, Websites	None

Course Description Form

1. Course Name:
Consumptive use and water duty

2. Course Code:
DWR 352

3. Semester / Year:
Second Semester/2024−2025

4. Description Preparation Date:
1/2/2024

5. Available Attendance Forms:
Theoretical lectures in class

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

2hour*15 week=30 hour/2 Units

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

Dr. Anmar Abdulaziz AL-Talib   anmar.altalib@uomosul.edu.iq

Alaa ismail naser   engalaaismail79@uomosul.edu.iq

8. Course Objectives

Course Objectives	1. how to use mathematical relations in a calculation of the potential Consumptive use(Eto) of different crops . 2. Identify the different stages of crop growth. 3. Draw the crop coefficient curve for different crops. 4. Calculating the water consumption of the crop. 5. Identify the different irrigation efficiencies within the field. 6. Calculation of water duty for irrigation projects . 7. Learn about different irrigation methods and their specifications.

9. Teaching and Learning Strategies

Strategy	i) An ability to distinguish, identify, define, formulate, and solve engineering problems by applying principles of engineering, science and mathematics. iii) An ability to create and carry out proper measurement and tests with quality assurance, analyze and interpret results, and utilize engineering judgment to make inferences.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1-2	4	Absolute water consumption - transpiration - evaporation - conditions affecting water consumption - direct measurements of water consumption - Hargreves equation - water consumption of natural plants, Calculation of water consumption reference ETo for crops using the Benman Monteth equation	Introducing the student to the importance of calculating plant water consumption	Lecture	
3-4	4	Find crop coefficient Kc for different plants and calculate water consumption of crop ETc, - Meteorology as a guide for water consumption - Plani - Creedli method - Jensen - Hayes method Climate and plant physiology (functions of plant members) and their relevance to water consumption	Introducing the student to how to calculate crop parameters and the most important methods of measuring water consumption	Lecture	H.W(1)
5	2	Plant growth season - Water consumption needs for crops during the growing season - Practical considerations	Introducing the student to how to calculate the	Lecture	Daily exam(1)

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

11. Course Evaluation

Evaluation type	Degree	
2 quizzes	10%	
4 homework	5%	

Term exam	25%
Final exam	60%
Total	100%

12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	• Irrigation principles and practices , by V.E. Hansen ,O.W.Israelsenand G.F. Stringham, fourth edition, john wiley and sons., 1984.
Main references (sources)	• Crop water requirements (FAO – 24 • -Crop evapotranspiration –guide lines for computing crop water requirements (FAO –56) • Design manual for irrigation &drainage- ministry of irrigation-Iraq (pencol),1980
Recommended books and references (scientific journals, reports…)	--------------
Electronic References, Website	https://classroom.google.com/c/NjI4NTMxNzE0NTIw

Course Description Form

1. Course Name:
Theory of Structures II

2. Course Code:
DWR 392

3. Semester / Year:
Spring / 2024–2025

4. Description Preparation Date:
1/2/2024

5. Available Attendance Forms:
Theoretical lectures in class

6. Number of Credit Hours (Total) / Number of Units (Total)
2/2

7. Course administrator's name (mention all, if more than one name)
Name: Dr. Mohammed Mukhlif Khalaf Email: mohammedmukhlifkhalaf@uomosul.edu.iq

8. Course Objectives	
Course Objectives	On successful completion of this course students will be able to:

		1. Analyze the statically indeterminate structures by consistent deformation method, (i) 2. Analyze the statically indeterminate beams and frames by least work method, (iii) 3. Analyze the statically indeterminate beams and frames by slope-deflection method, (iii) 4. Analyze the statically indeterminate beams and frames by moment distribution method, (iii)

9. Teaching and Learning Strategies

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

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Analyze the statically indeterminate beams by method of consistent deformation	Analysis the statically indeterminate structures by method of consistent deformation	Theoretical lectures in class	
2	2	Analyze the statically indeterminate frames by method of consistent deformation	Analysis the statically indeterminate structures by method of consistent deformation	Theoretical lectures in class	
3	2	Analyze the statically indeterminate trusses by method of consistent deformation	Analysis the statically indeterminate structures by method of consistent deformation	Theoretical lectures in class	H.W
4-5	4	Analyze the statically indeterminate beams by least work method	Analysis the statically indeterminate structures by least work method	Theoretical lectures in class	Exam
6-7	4	Analyze the statically indeterminate frames by least work method	Analysis the statically indeterminate structures by least work method	Theoretical lectures in class	
8-9	4	Analyze the statically indeterminate beams by slope-deflection method	Analysis the statically indeterminate structures by slope-deflection method	Theoretical lectures in class	H.W
10-11	4	Analyze the statically indeterminate frames by slope-deflection method	Analysis the statically indeterminate structures by slope-deflection method	Theoretical lectures in class	Exam
12-13	4	Analyze the statically indeterminate beams by moment distribution method	Analysis the statically indeterminate structures by moment distribution method	Theoretical lectures in class	H.W
14-15	4	Analyze the statically indeterminate frames	Analysis the statically indeterminate	Theoretical lectures in class	Exam

		by moment distribution method	structures by moment distribution method		

11. Course Evaluation

Quizzes	6pt
Homeworks	4pt
Term exams	30pt
Final Exam	60pt
Total	100pt

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Elementary Theory of Structures, YUAN-YU HSIEH, PRETICE-HALL, 1980.
Main references (sources)	Hibbeler R. C. (2012). Structural analysis (8th ed.). Pearson/Prentice Hall.
Recommended books and references (scientific journals, reports…)	--------------
Electronic References, Websites	--------------

Course Description Form

1. Course Name:
Reinforced Concrete Design
2. Course Code:
DWR 393
3. Semester / Year:
2/2024-2025
4. Description Preparation Date:
1/9/2023
5. Available Attendance Forms:
Theoretical lectures in class
6. Number of Credit Hours (Total) / Number of Units (Total)
2/2
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Saddam M. AHMED   Email: ahmed.saddam@uomosul.edu.iq

8. Course Objectives

Course Objectives	In DWR 393, initially students will learn how to analysis and design reinforced concrete elements. Upon successful completion of this course the student shall be able to assess the: 1. Mechanical properties of Shear strength in beams and design of shear reinforcement, (i) 2. Behavior of reinforced concrete columns, (i) 3. Analysis and Design of short columns, (ii) 4. Analysis and Design of flat slab, (ii) 5. Analysis and design of flat slab with drop panels, (ii) 6. Analysis and design of Two-way slab and beams, (ii) 7. Procuration for seismic resistance moment frames, (ii)

9. Teaching and Learning Strategies

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

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1 and 2	4	Introduction; syllabus; Advantages main and secondary reinforcements; steel and concrete shear resistance.	General introduction on reinforced concrete	Theoretical lectures in class	Exam1
3 and 4	4	Introduction to columns, Flexural Analysis of short columns (under axial loads), Load carrying capacity of short columns, ties design	Short columns	Theoretical lectures in class	Exam1
5	2	Short column under axial and bending actions, Interaction diagram (m-p curves).	Principles of Interaction diagram	Theoretical lectures in class	Exam2
6 and 7	4	Design of short columns subjected to bending and axial loads according to ACI Code: Design Methods.	Design of short columns	Theoretical lectures in class	Exam2
8 and 9	4	Design of flat slab: Load Factors, shear check	Design flat slab	Theoretical lectures in class	Exam3
10 and 11	4	Design of flat slab with drop panels.	Design flat slab	Theoretical lectures in class	Exam3
12, 13 and 14	6	Design of Rectangular Beams and two-Way Slabs, Shear check.	Principle of shear strength	Theoretical lectures in class	Exam3

11. Course Evaluation

Evaluation type	Degree
Three exam (Best two will consider)	40
Final exam	60
Total	100

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	• Jack M., Russell B. (2012) "DESIGN OF REINFORCED CONCRETE", nine Edition, Wiley, ISBN: 978-1-118-12984-5, USA. (can be downloaded from the Course web page).
Main references (sources)	• Gillesania, D.I.T. "FUNDAMENTALS OF CONCRETE DESIGN". Phils. DIT Gillesania, 2003. (can be downloaded from the Course web page).
Recommended books and references (scientific journals, reports…)	--------------
Electronic References, Websites	--------------

Course Description Form

1. Course Name:	
Flow measurements methods and their analysis	
2. Course Code:	
DWR 395	
3. Semester / Year:	
2/2024−2025	
4. Description Preparation Date:	
1/9/2023	
5. Available Attendance Forms:	
Theoretical lectures in class	
6. Number of Credit Hours (Total) / Number of Units (Total)	
2hr * 15 week /2 unit	
7. Course administrator's name (mention all, if more than one name)	
Name: Ziyad Taher Ali Email: ziyad.ali@uomosul.edu.iq Name: Waleed Tamur Email:	
8. Course Objectives	
Course Objectives	The aim of this course is to introduce the students two ways to measure the Flow in natural and man-made channels. The course will cover the main ways to measure their depth of flow and their instruments, also the main practical ways the measure the Flow in two ways, direct and Indirect. The limitations and requirements for each way also coved. This will be achieved through descriptive lectures with supervised tutorials
9. Teaching and Learning Strategies	

Strategy	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. Moreover, enabling the student to become familiar with the basic matters and the latest methods used in calculating flow and measuring Flows in waterways. This will be achieved through classes, interactive tutorials and by considering some challenging problems to motivate students.				

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Introducing the student to the flow measurement process	Introduction - Hydrometry - Direct methods of measurement - Indirect methods of measurement	Theoretical lectures in class	
2	2	Introducing the student to how to calculate the stages of rivers	Calculating water surface stage in rivers using recorded manual and automatic recorder.	Theoretical lectures in class	
3	2	Introducing the student to how to measure the velocity of streamflow	Measuring the velocity using a current meter device, which is divided into two types: the horizontal current meter and the vertical current meter.	Theoretical lectures in class	
4	2	Measure the velocity of flow using a current meter	Calibration of the current meter device and how to use the device in the field according to the nature of the river.	Theoretical lectures in class	
5	2	Studying the measurement of velocity using the float method	Using the float method to determine the velocity of surface flow and the limitation of this method	Theoretical lectures in class	H.W 1
6	2	Site measurement selection	How to choose the best section along a stretch of the river to measure flow speed, starting with indirect methods to measure Flow	Theoretical lectures in class	
7	2	Measurement of Flow	Indirect methods, starting with the velocity-area method, how to divide the cross-section of the stream into segments, then calculate the velocity in each segment and calculate the area, sub Flows then to obtain the total Flow.	Theoretical lectures in class	C.W 1
8	2	Measurement of Flow	The moving boat method to measure the velocity of flow and then calculate the drainage	Theoretical lectures in class	

9	2	Flow calculation by Chemical methods	How to use chemical methods and tracer materials in calculations of Flow, which include the sudden injection method, the constant rate injection method, and methods for determining the reach length.	Theoretical lectures in class	Monthly Exam
10	2	Electromagnetic method and ultrasound method in Flow calculations	Direct methods for measuring Flow are the : electromagnetic method, which relies on the Faraday principle in electricity, and the ultrasound method, which relies on ultrasound waves to measure velocity	Theoretical lectures in class	
11-12	4	Indirect methods of measuring the Flow	Flow measuring instrument such as weirs, flumes and gated structures and other hydraulic structure. Slope-area method, flood Flow using the area-slope method, stage-Flow relationship,	Theoretical lectures in class Theoretical lectures in class	Quiz
13-14	4	Indirect methods of measuring the Flow	The Permanent Control section, the Shifting Control section, the effect of backwater, the effect of unsteady flow, Calibration curve,	Theoretical lectures in class	
15	2	Indirect methods of measuring the Flow	Extrapolation of Rating Curve, Conveyance Method, Logarithmic-Plot Method	Theoretical lectures in class	Monthly Exam

11. Course Evaluation

Evaluation type	Degree
quizzes	10
Homework & Classwork	5
Term exam	25
Final exam	60
Total	100

12. Learning and Teaching Resources

Required textbooks (curricular books any)	• **Herschy, R.W., 2008. *Streamflow measurement*. CRC press.** • ***K. Subramanya, "Engineering Hydrology," 3rd Edition, Tata McGraw-Hill Publishing, New Delhi, 2008.*** • **Liptak, B.G., 1993. *Flow measurement*. CRC Press.**
Main references (sources)	• ***K. Subramanya, "Engineering Hydrology," 3rd Edition, Tata McGraw-Hill Publishing, New Delhi, 2017.***

Recommended books and references (scientific journals, reports…)	--------------
Electronic References, Websites	https://classroom.google.com/c/NjYxNTgwMjI5MzQ2

Fourth Level

المستوى الدراسي الرابع (الفصل الاول)

الملاحظات	رمز المقرر	الممهد ان وجد	عدد الوحدات	عدد الساعات العملية	عدد الساعات النظرية	اسم المقرر باللغة الإنكليزية	اسم المقرر باللغة العربية	نوع المطلب (اجباري – اختياري)	اسم المتطلب
	-	-	2	---	2	English language – Upper Intermediate	اللغة الانكليزية – ما بعد المتوسط	اجباري	متطلبات الجامعة
	ENGC 425	-	٢	---	٢	Engineering Management	إدارة هندسية	اجباري	متطلبات الكلية
	DWR 440	Open Channel and Hydraulic Machines	٣	٢	٢	Design of Hydraulic Structures I	تصميم المنشآت الهيدروليكية I	اجباري	متطلبات القسم
	DWR 441	Irrigation Principles and Practices	٣	٢	٢	Design and Gravity Irrigation Systems	تصميم منظومات الري السيحي	اجباري	
	DWR 442	Irrigation Principles and Practices and Drainage Engineering	٢	---	٢	Design of Irrigation and Drainage Networks	تصميم شبكات الري والبزل	اجباري	
	DWR 443	Surface Hydrology	٢	---	٢	Design of Gravity and Arch Dams	تصميم السدود الجاذبية والقوسية	اجباري	
	DWR 444	Soil Mechanics II	٢	---	٢	Foundation Engineering	هندسة الاسس	اجباري	
	DWR 445	جميع متطلبات القسم الاجبارية للمستوى الثالث	٢	---	٢	Graduation Project I	مشروع التخرج I	اجباري	
يختار الطالب مقرر واحد. عدد الوحدات المطلوبة = ٢ وحدة	DWR 490	-	٢	---	٢	Linear Algebra	الجبر الخطي	اختياري	
	DWR 491	-	٢	---	٢	Operation Research	بحوث العمليات	اختياري	
			٢٠	٤	١٨	مجموع ساعات ووحدات الفصل الدراسي الأول			

المستوى الدراسي الرابع (الفصل الثاني)

الملاحظات	رمز المقرر	الممهد ان وجد	عدد الوحدات	عدد الساعات العملية	عدد الساعات النظرية	اسم المقرر باللغة الإنكليزية	اسم المقرر باللغة العربية	نوع المطلب (اجباري – اختياري)	اسم المتطلب
	ENGC426		٢	---	٢	Engineering Economic	الاقتصاد الهندسي	اجباري	متطلبات الكلية
	DWR 446	Design of Hydraulic Structures I	٣	٢	٢	Design of Hydraulic Structures II	تصميم المنشآت الهيدروليكية II	اجباري	متطلبات القسم
	DWR 447	Design and Gravity Irrigation Systems	٣	٢	٢	Design of Sprinkler and Drip Irrigation System	تصميم منظومات الري بالرش والتنقيط	اجباري	
	DWR 448		٢	2	1	Estimations and Specifications	التخمين والمواصفات	اجباري	
	DWR 449	Design of Gravity and Arch Dams	٢	---	٢	Earth and Earth Rock Fill Dams	السدود الترابية والإملائية	اجباري	
	DWR 450	Foundation Engineering	٢	---	٢	Foundation Engineering of Hydraulic Structures	هندسة الاسس للمنشآت الهيدروليكية	اجباري	
	DWR 451		2	---	2	Sediment Transport	انتقال الرسوبيات	اجباري	
	DWR 452	مشروع التخرج I	٢	---	٢	Graduation Project II	مشروع التخرج II	اجباري	
يختار الطالب مقرر واحد. عدد الوحدات المطلوبة = ٢ وحدة	DWR 492	-	٢	---	٢	Finite Elements	العناصر المحددة	اختياري	
	DWR 493	-	٢	---	٢	Water Supply Engineering	هندسة تجهيز المياه	اختياري	
			٢٠	٦	١٧	مجموع ساعات ووحدات الفصل الدراسي الثاني			

Course Description Form

1. Course Name:

	English Language – Upper Intermediate

2. Course Code:

——————

3. Semester / Year:

First/ 2024–2025

4. Description Preparation Date:

1/6/2023

5. Available Attendance Forms:

Lectures in class

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

2/2

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

Name: Dr. Ahmed A. M. Al-Ogaidi
Email: a.alogaidi@uomosul.edu.iq

8. Course Objectives

Course Objectives	To understand and analyze various texts by reading exercises. To employ appropriate vocabulary and expressions. To learn the student different grammar tenses. To learn the students the phrasal verbs.

9. Teaching and Learning Strategies

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

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	To understand and analyze various texts by reading exercises. To employ appropriate vocabulary and expressions.	Reading Passage 1: Carly's Family Passage 2: Spider Webs	A lecture in the class	HW and Quiz
2	2	To learn the student different grammar tenses.	Grammar Simple present tense	A lecture in the class	HW and Quiz
3-5	6	To understand and analyze various texts by reading exercises. To employ appropriate vocabulary and expressions.	Reading Passage 4: Robots Passage 5: Materials Passage 6: Fruit Fly Fix Passage 7: Dish Soap for Dinner	A lecture in the class	HW and Quiz
6	2	To learn the student different grammar tenses.	Grammar Present continuous tense	A lecture in the class	HW and Quiz

7	2	To understand and analyze various texts by reading exercises. To employ appropriate vocabulary and expressions. To learn the student different grammar tenses.	Term Exam	A lecture in the class	Exam
8	2	To learn the students the phrasal verbs.	A list contains 47 phrasal verbs	A lecture in the class	Exam
9	2	To learn the student different grammar tenses.	Grammar Simple past tense	A lecture in the class	HW and Quiz
10-1	6	To understand and analyze various texts by reading exercises. To employ appropriate vocabulary and expressions.	Reading Who is J. K. Rowling? What are some special rules for Chinese New Year? Where is Buckingham Palace?	A lecture in the class	HW and Quiz
13-1	6	To learn the student different grammar tenses.	Grammar Simple future tense Present perfect tense	A lecture in the class	HW and Quiz

11. Course Evaluation

Evaluation type	Degree
5 quizzes	10
5 homework	10
Term exam	20
Final exam	60
Total	**100**

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Soars, L. John.(2005). New Headway Upper-Intermediate: Student's Book.
Main references (sources)	Heyer, S., & Heyer, S. (1996). *True stories in the news: A beginning reader*. Longman. Seaton, A., & Mew, H. (2007). *Basic English Grammar*.
Recommended books and references (scientific journals, reports…)	---------------
Electronic References, Websites	---------------

Course Description Form

1. Course Name:
Engineering Management

2. Course Code:
ENGC425

3. Semester / Year:
2/2024-2025

4. Description Preparation Date:
1/9/2023

5. Available Attendance Forms:
Theoretical lectures in class

6. Number of Credit Hours (Total) / Number of Units (Total)
2/2

7. Course administrator's name (mention all, if more than one name)
Name: Dr. Rasha M. Sami Fadhil   Email: Rasha.Fadhil@uomosul.edu.iq

8. Course Objectives

Course Objectives	**On successful completion of this course students will be able to:** **(a)** effectively plan, organize, schedule, execute, and lead engineering management-related projects using virtual project teams;(ii) **(b)** Understand the importance of risk, cost, schedule and resource control and management of a projectlearn, (ii) **(c)** use project management software; (i) **(d)** assess team, team member, and project performance (i)

9. Teaching and Learning Strategies

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

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	**What is a Project. Project Management.** (i)	Introduction of engineering management	Theoretical lectures in class	Exam
3-2	4	Contract Parties.,The Resident Engineer. **Contract Documents.** Safety and Risk.	Defines and important of engineering management	Theoretical lectures in class	Exam

		Construction Project Management System. Project Planning. (i)			
5-4	4	Bar chart method (Gantt Chart). Network Analysis Method (Critical Path Method(ii)	Techniques for Planning and Scheduling	Theoretical lectures in class	Exam
7-6	4	Activity on arrowAOA Activity on node AON(ii)	Techniques for Planning and Scheduling	Theoretical lectures in class	Exam
8	2	Monthly Exam			
10-9	4	Resources alloction , Line of balance(LOB) (ii)	Techniques for Planning and Scheduling	Theoretical lectures in class	Exam
11-12	4	Program Evaluation Review Technique (PERT) (ii)	Methods of Project Scheduling	Theoretical lectures in class	Exam
14-13	4	Crashing project (i) And fast -Ttracking	Project management	Theoretical lectures in class	Exam
15	2	Term Exam			

11. Course Evaluation

Evaluation type	Degree
2 homework	20
Term exam	20
Final exam	60
Total	100

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	---------------
Main references (sources)	Primavera P6 for Project Management
Recommended books and references (scientific journals, reports…)	---------------
Electronic References, Websites	---------------

Course Description Form

1. Course Name:
Design of Hydraulic Structures I
2. Course Code:
DWR 440

3. Semester / Year:
1/ 2024-2025

4. Description Preparation Date:
9/4/2024

5. Available Attendance Forms:
In-person

6. Number of Credit Hours (Total) / Number of Units (Total)
4/3

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

Name: Nashwan Kamal Aldeen Mohammed

Email: nashwan.alomari@uomosul.edu.iq

8. Course Objectives

Course Objectives	
	• To understand and classify the hydraulic structures and their uses.
	• To understand the behavior of water seepage under hydraulic structures and develop the ability to compute the creep line and uplift pressure using different methods.
	• To perform the design steps of some types of stilling basin structures.
	• To understand the water diversion works and perform the head and cross regulator design steps.

9. Teaching and Learning Strategies

Strategy	
	The primary strategy that will be adopted in delivering this module is to encourage students' participation in classes, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials, and practical designing of the hydraulic structures.
	PowerPoint presentations and boards are used in the classroom. Examples and problems will be solved and illustrated on the classroom board. Tutorials are also organized to establish closer contact with students.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	Classify the hydraulic structures and their uses,	Subject topics - Introduction of types of hydraulic structures	Presentation	

2, 3, 4, and 5	**16**	1. Recognize problems accompanying water seepage under the hydraulic structures, 2. Apply the basic concepts of engineering to calculate seepage and uplift pressure under different hydraulic structures,	Irrigation structures on permeable foundations. Seepage and Uplift pressure – Bligh theory – Lane theory– Flow net analysis- Khosla's theory	Presentation & whiteboard	Quiz1, and Assignment 1
6	**4**	Recognize the components of Protection works of approaches for horizontal floor	Protection works of approaches for horizontal floor	Presentation	
7, 8, 9, and 10	**16**	Identify the components of the stilling basin and design some of their types.	Hydraulic jump and energy dissipation devices - drawing of hydraulic jump- Stilling basins (R.S.Varshney stilling basin, SAF stilling basin, U.S.B.R II stilling basin).	Presentation & whiteboard	Quiz2, Assignment2, and Monthly exam
11, 12, 13, and 14	**16**	1. Develop the ability of the students to solve design problems and analyze the data to evaluate the feasibility of components of the head and cross-regulator 2. Assess and analyze the safety of the head and cross regulator,	Head and Cross regulator	Presentation & whiteboard	Term exam
15	**4**	Demonstrate the ability to lead and productively participate in group situations by assigning multidisciplinary design projects for some hydraulic structures	a design and apply the example of the cross and head regulator + General Revision	Presentation & whiteboard	

1. Course Evaluation

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

2. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Varshney, R.S., Gupta, S. C., Gupta, R. L., (1979) *"Theory & design of irrigation structures"*. Nem Chand & Bros; Roorkee, India.
Main references (sources)	1. Asawa, G. L. (2008) *"Irrigation and Water Resources Engineering"* New age International(P) Limited, Publishers. 2. Chanson, Hubert., (2004) *"The Hydraulics of Open Channel Flow: An Introduction"* Elsevier. 3. Chow, Ven te., (1959) *"Open Channels Hydraulics"* Mc Graw Hill. 4. Schall, J.D., Thompson, p. L., Zeryes, S. M., Kilgore, R. T., and Morris, J. L. (2012) *"Hydraulic design of Highway culverts "* (Report No . FHWA – HIF – 12 – 026 HD55).
Recommended books and references (scientific journals, reports…)	None
Electronic References, Websites	None

Course Description Form

1. Course Name:
Design of Gravity Irrigation Systems
2. Course Code:
DWR 441
3. Semester / Year:
Spring/ 2024-2025
4. Description Preparation Date:
15-3-2024
5. Available Attendance Forms:
In person
6. Number of Credit Hours (Total) / Number of Units (Total)
3/3
7. Course administrator's name (mention all, if more than one name)

Name: Dr. Zeyad Ayoob Sulaiman, Dr. Abdulaziz Hamid
Email: z.alsinjarii@uomosul.edu.iq

8. Course Objectives

Course Objectiv	Students who successfully complete this course have: 1. Learned characteristics of various methods of surface irrigation systems, (i) 2. Understood economics of irrigation, (i) 3. Able to design various types of gravity irrigation systems after collecting the required design data and analyzing these data in a way that suits the design of the surface irrigation system design, (i) and (ii) 4. Able to select a suitable irrigation system for a given situation, (ii) 5. Able to select the most economic irrigation design alternative, (vi)

9. Teaching and Learning Strategies

Strategy	Power point presentation Lecture. Handouts, Field trip and you tubes

10. Course Structure

Week	Hours	L. O	Unit or subject name	Learning method	Evaluation method
1	4	i	Introduction to the farm irrigation and the basics of system desi	Powerpoint Whiteboard discussion	H.W
2	4	i	Basic design Factors/Consumptive use/Soil/Irrigation interval water application depth	Powerpoint Whiteboard doscussion	exam
3	4	i	Efficiency ,adequacy ,and uniformity of irrigation	Powerpoint Whiteboard doscussion	H.W
4	4	i&ii	Water infiltration into soil	Powerpoint Whiteboard doscussion	exam
5	4	i&ii	Land grading/Description ,criteria ,and preparatory steps/ Desig land grading/Slopes and field levels	Powerpoint Whiteboard doscussion	exam
6	4	ii	Earthwork balance and earthwork calculations	Powerpoint Whiteboard doscussion	exam
7	4	ii	Surface irrigation/Mechanism of surface irriga process/Infiltration opportunity time and application depth	Powerpoint Whiteboard doscussion	H.W
8	4	ii	Water balance concept in surface irrigation	Powerpoint Whiteboard doscussion	exam
9	4	ii	Border irrigation system/Assumptions ,considerations limitations of design/Miscellaneous notes	Powerpoint Whiteboard doscussion	exam
10	4	vi	Design flow rate/Flow depth/Maximum border length/Border w	Powerpoint Whiteboard doscussion	exam

11	4	ii	Furrow irrigation/Furrow intake characteristics/ Considerati assumptions, limitations, and design equations	Powerpoint Whiteboard doscussion	H.W
12	4	i&ii	Runoff control techniques	Powerpoint Whiteboard doscussion	exam
13	4	vi	Cutback irrigation, Runoff recovery system	Powerpoint Whiteboard doscussion	H.W
14	4	vi	Basin irrigation/ Considerations, assumptions, limitations, design equations/Booher method	Powerpoint Whiteboard doscussion	exam
15	4	I,ii vi	Final Exam		Exam

11. Course Evaluation

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

12. Learning and Teaching Resources

Required textbo (curricular books, any)	On-farm irrigation systems engineering\by A.Y.Hachum, and H.I.Yasin. textbook- M University,1992.
Main referen (sources)	Recahrd H. Cuenca Irrigation System Design: An Engineering Approach, 1989.
Recommended books and references (scientific journals, reports…)	
Electronic Referenc Websites	https://www.youtube.com/channel/UCg_SvLC7LCRLmVtTApYyLA/videos

Course Description Form

1. Course Name:	
Design of irrigation and drainage networks	
2. Course Code:	
DWR 442	
3. Semester / Year:	
First 2024−2025	
4. Description Preparation Date:	
9/4/2024	
5. Available Attendance Forms:	
Lectures and Tutorials	
6. Number of Credit Hours (Total) / Number of Units (Total)	
2 hr/2 cridits	
7. Course administrator's name (mention all, if more than one name)	
Name: Azza Nasralla Jaralla Al-Talib Email: a.altalib@uomosul.edu.iq	

8. Course Objectives

Course Objectives	• **Inform students about the principles of naming and numbering the canals and drain networks** • **learn canals and drains layout on contour maps** **Inform about water supply systems and calculating discharge in canals sections** • **Inform types of earth canals and their design** • **Lear drawing the synoptic diagram for canals and drains** • **Lear methods of calculating seepage from earth canals**

9. Teaching and Learning Strategies

Strategy	The strategy is to provide theoretical lectures using presentations and question solving in an interactive way with students inside the classroom, as well as tutorials exercises.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Learn about Naming and numbering	Naming and numbering for irrigation and drainage	Presentation And white board	Monthly exam

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

11. Course Evaluation

Evaluation type	degree
First monthly exam	20
Second monthly exam	20
Final exam	60

total	100

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Design Manual for Irrigation and Drainage, Pencol Engineering Consultants, London
Main references (sources)	Theory and Design of irrigation structures (vol.1 By: Varshney, ,Gupta,S.C. and Gupta, R. NEMCHAND & BR ROORKEE,INDIA,1977
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	https://uclouvain.be/en-cours-2023-lbres2104

Course Description Form

1. Course Name
Design of gravity and arch dams

2. Course Code:
DWRE 423

3. Semester / Year
Fall semester / 2024-2025

4. Description Preparation Date
31/8/2023

5. Available Attendance Forms:
Theoretical lectures in class

6. Number of Credit Hours (Total) / Number of Units (Total)
30/2

7. Course administrator's name (mention all, if more than one name)
Name: Yousif Hashim Abdullah Al-Aqeeli
Email: y.alaqeeli@uomosul.edu.iq
Name: Ali Ahmed Abdulmawjood
Email: aliabdulmawjood@uomosul.edu.iq

8. Course Objectives

Course Objectives	• An ability to specify the type of gravity dam according to the conditions of
	• valley. (i)
	• An ability to analyses the forces that affected to gravity (i), (ii)
	• An ability to identify the solutions for the problems that may be appear in the analyse gravity dams. (ii)
	• An ability to specify the type of arch dam according to the conditions of
	• valley. (i)

- Formulate a preliminary design of gravity base on the chosen type. (ii)
- Formulate a preliminary design of arch Dams base on the chosen type. (ii)

9. Teaching and Learning Strategies

Strategy	The aim of this course is to present number of sessions during fifteen weeks. These sessions include different subjects are introduced to the students. The fourth-class students should be awareness about the hydrological aspects which related to the hydraulic designs of dams. The objectives of dams and reservoirs construction are explained in detail. This course will cover different subjects related to the design of gravity and arch dams. These subjects are types of gravity and arch dams, types of foundation, modes of failure in gravity dams, Design of gravity dams, in addition to the analyses all of the forces and stresses which effected to the body of the dam with taking into consideration the specificity of each type of dams.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
2	4	Introduction to Dams Engineering, Storage Works, Hydrological Aspects, Geological Investigations, Reservoi Site Selection, Storage Zones of a Reservoir	Hydrological aspects of dam	Theoretical lectur in class	Exame
2	4	Reservoir Storage Capa Estimation Live Storage (Tabulation Method, Sequent Peaks Analysis Optimization Analysis)	Reservoir Storage Capacity	Theoretical lectur in class	HW and Exame
1	2	Reservoir Sedimentatio	Reservoir Sedimentation	Theoretical lectur in class	HW and Exame
1	2	The probable life of the reservoir		Theoretical lectur in class	HW and Exame
1	2	Classification of dams, Factors governing the selection of a particular type of dam	Classification of dams	Theoretical lectur in class	Exame
1	2	Gravity dams (Advantag Disadvantages)	Gravity dams	Theoretical lectur in class	Exame
1	2	Gravity dams (Modes o failure and criteria for structural stability of gravity dam)	Gravity dams	Theoretical lectur in class	Exame

1	2	Gravity dams (Principle and shear stress)	Gravity dams	Theoretical lecture in class	HW and Exame
1	2	Elementary profile of the gravity dam (Design considerations) (Stresses development in an elementary profile)	Gravity dams	Theoretical lecture in class	HW and Exame
2	4	Arch dams	Arch dams	Theoretical lecture in class	HW and Exame

11. Course Evaluation

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

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	1. Hydraulics of Dams and Reservoirs, By: Senturk, Water Resources Publications, Colorado U.S.A.,1994. 2. Theory and Design of Irrigation Structures, Vol. II, R. S. Varshney, S. C. Gupta and R. L. Gupta, Nem Chand & Bros, Roorkee (U.P.), India,1982. 3. Earth−Rock Dams, Engineering Problems of Design and Construction, By: J. L. Sherard, R. J. Woodward, S. F. Gizienske and W. A. Clevenger, John Wiley and Sons, Inc., New York, 1963. 4. Engineering for Dams, By: W. P. Greager, J. D. Justin and J. Hinds, In three Volumes, John Wiley and Sons, Inc., New York, 1961.
Main references (sources)	----------------
Recommended books and references (scientific journals, reports…)	Loucks, D. P., Van Beek, E., Stedinger, J. R., Dijkman, P., and Villars, M. T. (2005). Water Resources System Planning and Management: An Introduction to Methods, Models and Applications. Paris, UNESCO.
Electronic References, Websites	-----------------

Course Description Form

1. Course Name:
Foundation Engineering

2. Course Code:
DWR 444

3. Semester / Year:
Fall semester (first) / 2023 -2024

4. Description Preparation Date:
1/4/2024

5. Available Attendance Forms:
Class lectures + Electronic lectures

6. Number of Credit Hours (Total) / Number of Units (Total)
30 hours/ 2 credits

7. Course administrator's name (mention all, if more than one name)
Name: **I. M. A. Al-kiki**   Email: **i.alkiki@uomosul.edu.iq**
Dr.Zuheir Karabash   Email: **karabash@uomosul.edu.iq**

8. Course Objectives

Course Objectives	**The optimal, good, economical and safe design of engineering pedestrian foundations (surface foundations) in terms of the student's familiarity with:** ● **oil investigations and exploration to choose the appropriate (foundation type, foundation depth, foundation dimensions, foundation shape).** ● **Analysis and distribution of stresses under foundations.** ● **Subsidence and joining under foundations.** ● **Soil bearing capacity.** ● **Analysis and design of retaining walls.**

9. Teaching and Learning Strategies

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

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	**Defining foundation geometry and**	**Introduction and general information**	**Lecture in class**	**Class discussions**

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

11. Course Evaluation

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

12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	- الشكرجي ، يوسف والمحمدي، نوري، " هندسة الأسس " ، جامعة بغداد ،الطبعة الاولى، 1985
Main references (sources)	-Das, B. M., "Principle of Foundation Engineering ", Thomson Books/Cole, California State University, Sacramento, 5th ed., 2004. - Peak, R. B., Hanson, W. E. and Thorburn, T.H., " Foundation Engineering ", John Wiley and Sons, 2nd ed., 1974 - Bowles, J.E., P.E., S.E." Foundation Analyses and Design ", The McGraw-Hill Companies, Inc, 5th ed., 2006. -Das, B. M., & Sivakugan, N.," Principles of foundation engineering", Cengage learning, 2018.
Recommended books and references (scientific journals, reports…)	13. Al-Rafidain Engineering Journal. 14. Highway Research Record , H R R. 15. Journal of the Geo technical engineering Division , ASCE. 16. Journal of Soil Mechanics and Foundation Division, Proc. ASCE. 17. Transportation Research Record , TRR. 18. Journal of the Japan Society of Civil Engineering , JSCE. 19. The Quarterly Journal of Engineering Geology.
Electronic References, Websites	None

Course Description Form

1. Course Name:
Operations Research
2. Course Code:
DWR 491
3. Semester / Year:
1/2024−2025
4. Description Preparation Date:
1/9/2023
5. Available Attendance Forms:

Theoretical lectures in class	

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

2/2

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

Name: Mohammed A. khattab   Email: m.almukhttar@uomosul.edu.iq

8. Course Objectives

Course Objectives	Students will be familiar with basic operations research terminology, including mathematical modeling, feasible solutions, optimization, and iterative calculations. Upon successful completion of this course the student will be able to:
	1- Know the basic terms of operations research. i
	2- Knowledge of mathematical modeling. i
	3- Students will learn that correctly defining the problem is the most important (and most difficult) stage of OR. i
	4- Analysis of possible solutions and iterative calculations. ii
	5- Students will be able to analyze the intangible (non-measurable) factors (such as human behavior) that must be taken into account in the final decision. ii

9. Teaching and Learning Strategies

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

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Know the basic terms of operations research. i	Introduction to Operations Research Concept of optimization model.	Theoretical lectures in class	HW
2	2	Knowledge of mathematical modeling. i	Linear Programming "LP" Formulation of objective function and constraints.	Theoretical lectures in class	HW
3-4	4	Students will learn that correctly defining the problem is the most important (and most difficult) stage of OR. i	Solve an optimization problem using the graphical method	Theoretical lectures in class	HW &Quiz
5-8	6	Analysis of possible solutions and iterative calculations. ii	Solve an optimization problem using the Simplix method	Theoretical lectures in class	Exam
9-11	6	Students will be able to analyze the intangible (non-measurable) factors (such as human behavior)	Solve an optimization problem using M-method	Theoretical lectures in class	HW& Quiz

		that must be taken into account in the final decision. ii			
12-15	8	Students will be able to analyze the intangible (non-measurable) factors (such as human behavior) that must be taken into account in the final decision. ii	Solve an optimization problem using Tow-Phase method	Theoretical lectures in class	HW & Exam

11. Course Evaluation

Evaluation type	Degree
H.W. 5 (each 1 pt)	5
Two Quiz (each 2.5 pt)	5
Two Monthly exam (each 15 pt)	30
Final Exam	60
Total	100

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	• Operation Research, an Introduction, Taha A. Hamdy, 8th edition,2003.
Main references (sources)	• Engineering Optimization: Theory and Practice, Fourth Edition Singiresu S. Rao Copyright © 2009 by John Wiley & Sons, Inc.. • Operation Research, Application and Algorithms, Winston, Wayne L., 3rd edition,1994.
Recommended books and references (scientific journals, reports…)	--------------
Electronic References, Websites	--------------

Course Description Form

1. Course Name:
Engineering Economy
2. Course Code:
ENGC426
3. Semester / Year:
2/2024−2025

4. Description Preparation Date:

1/9/2023

5. Available Attendance Forms:

Theoretical lectures in class

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

2/2

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

Name: Dr. Rasha M. Sami Fadhil   Email: Rasha.Fadhil@uomosul.edu.iq

8. Course Objectives

Course Objectives	**On successful completion of this course students will be able to:** • **Understand and apply fundamental concepts of engineering economy (i).** • **Classify the interest rate & define the Cash Flow Diagram (i).** • **Economically evaluate and analysis engineering projects (ii).** • **Compare engineering alternatives to choose the most feasible and efficient one. (ii).**

9. Teaching and Learning Strategies

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

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Water Resources Economy Principles of Engineering Economics Cash Flow Diagram (i)	Fundamentals of Engineering Economics	Theoretical lectures in class	Exam
3-2	4	Uniform Annual Series Uniform Gradient Series Nominal and Effective Interest Rates (i) Payback Period: Simple Payback – Discounted payback.	Fundamentals of Engineering Economics	Theoretical lectures in class	Exam
5-4	4	Present Worth (PW) Method (ii)	Evaluation and Comparison of Engineering Projects	Theoretical lectures in class	Exam
7-6	4	Future Worth (FW)Method (ii)	Evaluation and Comparison of Engineering Projects	Theoretical lectures in class	Exam
8	2	Monthly Exam			

10-9	4	Annual Worth (AW) Method (ii)	Evaluation and Comparison of Engineering Projects	Theoretical lectures in class	Exam
11-12	4	Benefit/Cost Ratio Method (ii)	Evaluation and Comparison of Engineering Projects	Theoretical lectures in class	Exam
14-13	4	Project Pricing. Progress Payments. Cash Flow Forecasting(i)	Project Financial Management	Theoretical lectures in class	Exam
15	2	Term Exam			

11. Course Evaluation

Evaluation type	Degree
2 homework	20
Term exam	20
Final exam	60
Total	100

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	--------------
Main references (sources)	1- Engineering Economy (7th ed.), L. Blank and A. Tarquin (2012), McGraw-Hill. 2-Water Resources Systems Planning and Management, S.K. Jain and V.P. Singh (2003), Elsevier. 3-Water Resources Handbook for Economics, NRCS (1998). 4- Engineering Economic Analysis, Oxford, New York,2004
Recommended books and references (scientific journals, reports…)	--------------
Electronic References, Websites	--------------

Course Description Form

1. Course Name:
Design of Hydraulic Structures II
2. Course Code:
DWR 446
3. Semester / Year:
2/ 2024−2025
4. Description Preparation Date:
9/4/2024

5. Available Attendance Forms:

In-person and electronic (Google Classroom - 743mi24)

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

4/3

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

Name: Nashwan Kamal Aldeen Mohammed

Email: nashwan.alomari@uomosul.edu.iq

8. Course Objectives

Course Objectives	
	• To understand the canal headwork, and its use, and perform barrage design steps.
	• To understand the importance of using channel transitions and develop the ability to design a transition.
	• To ability to design a syphon structure (as a sample of cross drainage works).
	• To understand and ability to design some hydraulic structures (culverts and Sharda-type falls).

9. Teaching and Learning Strategies

Strategy	
	The primary strategy that will be adopted in delivering this module is to encourage students' participation in classes, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials, and practical designing of the hydraulic structures.
	PowerPoint presentations and boards are used in the classroom. Examples problems will be solved and illustrated on the classroom board. Tutorials are a organized to establish closer contact with students.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1, 2, 3, 4, and 5	**20**	Develop the ability of the students to solve design problems and analyze the data to evaluate the feasibility of components of the canal headwork (barrage types). In addition, assess and analyze the safety of the canal headwork structure (barrage types).	Design of canal structures (canal head work).	Presentation & whiteboard	Quiz, Assignment, and monthly exam

6, and 7	**8**	Develop the ability of the students to solve the design problems and analyze the data to evaluate some types of flow transition	Transition. Introduction of transitions (R.S Chaturvedi's, Mitra's, and Hind's transitions). Design of transitions (Hind's transitions).	Presentation & whiteboard	Assignment
8, 9, and 10	**12**	Develop the ability of the students to solve design problems and analyze the data to evaluate the cross drainage works, (Design example of syphon).	Cross drainage works.	Presentation & whiteboard	Quiz, and Assignment
11, 12, 13, and 14	**16**	Develop the ability of the students to solve the design of the culvert	Culvert. Introduction and design example of the culvert.	Presentation & whiteboard	Term exam
15	**4**	Develop and solve the design of the canal falls (Sharda-type fall).	Canal Falls. Design of the canal falls (Sharda-type fall).	Presentation & whiteboard	

3. Course Evaluation

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

4. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Varshney, R.S., Gupta, S. C., Gupta, R. L., (1979) "*Theory & design of irrigation structures*". Nem Chand & Bros; Roorkee, India.

Main references (sources)	5. Asawa, G. L. (2008) *"Irrigation and Water Resources Engineering"* New age International(P) Limited, Publishers. 6. Chanson, Hubert., (2004) *"The Hydraulics of Open Channel Flow: An Introduction"* Elsevier. 7. Chow, Ven te., (1959) *"Open Channels Hydraulics"* Mc Graw Hill. 8. Schall, J.D., Thompson, p. L., Zeryes, S. M., Kilgore, R. T., and Morris, J. L. (2012) *"Hydraulic design of Highway culverts "* (Report No . FHWA – HIF – 12 – 026 HD55).
Recommended books and references (scientific journals, reports…)	None
Electronic References, Websites	None

Course Description Form

1. Course Name:
Design of Sprinkler and Drip Irrigation Systems
2. Course Code:
DWR 447
3. Semester / Year:
Fall/ 2024-2025
4. Description Preparation Date:
15-3-2024
5. Available Attendance Forms:
In person
6. Number of Credit Hours (Total) / Number of Units (Total)
3/3
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Zeyad Ayoob Sulaiman, Mr. Abdulghani Khalaf Email: z.alsinjarii@uomosul.edu.iq

8. Course Objectives

Course Objectiv	Students who successfully complete this course have:
	1. **Learned characteristics of sprinkler and drip irrigation systems, (i)**
	2. **Understood economics of irrigation, (i)**
	3. **Able to design various types of pressurized irrigation systems after collecting required design data and analyzing these data in a way that suits the design, (i) and (ii)**
	4. **Able to select a suitable irrigation system for a given situation, (ii)**
	5. able to select the most economist irrigation design alternative, (vi)

9. Teaching and Learning Strategies

Strategy	Power point presentation Lecture. Handouts, Field trip and y tubes

10. Course Structure

Week	Hours	L.O	Unit or subject name	Learning method	Evaluation method
1	4	i	Sprinkler irrigation Sprinkler irrigation basic concept Advantages and problems of sprinkler irrigation Basic and supplementary components Types of sprinkler irriga systems	Powerpoint Whiteboard discussion	H.W
2	4	i	Fundamentals of sprinkler irrigation Single sprinkler water distribution Layout of stationary system/Hydraulic of sprinkler nozzle	Powerpoint Whiteboard doscussion	exam
3	4	i	Uniformity of sprinkler water distribution	Powerpoint Whiteboard doscussion	H.W
4	4	i&ii	Alternate setting of sprinkler laterals Sprinkler spray losses sprinkler irrigation efficiency	Powerpoint Whiteboard doscussion	exam
5	4	i&ii	Sprinkler lateral pipes Fundamentals of flow hydraulic pipes Allowable pressure variation /Sprinkler pipe size	Powerpoint Whiteboard doscussion	exam
6	4	ii	Friction head loss/Layout of sprinkler pipes Moving and operation sprinkler pipes Sprinkler pipe material	Powerpoint Whiteboard doscussion	exam
7	4	ii	Sprinkler irrigation major pipes distribution system Types of major pipes distribution system Design requirements/ Distribution system layout	Powerpoint Whiteboard doscussion	H.W
8	4	ii	Design methods (flow velocity method, allowable friction met economic analysis method)	Powerpoint Whiteboard doscussion	exam
9	4	ii	Economic analysis general procedure Total dynamic head	Powerpoint Whiteboard doscussion	exam

10	4	vi	Applications on design of main pipe systems	Powerpoint Whiteboard doscussion	exam
11	4	ii	Trickle irrigation Advantages and problems of drip irrigation Trickle system basic component Soil-water-crop factors	Powerpoint Whiteboard doscussion	H.W
12	4	i&ii	Emitters selection/Hydraulic of trickle network	Powerpoint Whiteboard doscussion	exam
13	4	vi	General notes about evaluation of on- farm irrigation systems	Powerpoint Whiteboard doscussion	H.W
14	4	vi	Applications of Drip Irrigations	Powerpoint Whiteboard doscussion	exam
15	4	I,ii vi	Final Exam		Exam

11. Course Evaluation

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

12. Learning and Teaching Resources

Required textbo (curricular books, any)	On-farm irrigation systems engineering\by A.Y.Hachum, and H.I.Yasin. textbook- M University,1992.
Main referen (sources)	Recahrd H. Cuenca Irrigation System Design: An Engineering Approach, 1989.
Recommended books and references (scientific journals, reports…)	
Electronic Referenc Websites	https://www.youtube.com/channel/UCg_SvLC7LCRLmVtTApYyLA/videos

Course Description Form

1. Course Name:
Estimation and Specification

2. Course Code:
DWR448

3. Semester / Year:
2/2024−2025

4. Description Preparation Date:
1/9/2023

5. Available Attendance Forms:
Theoretical lectures in class and lectures in the lab

6. Number of Credit Hours (Total) / Number of Units (Total)
3/3

7. Course administrator's name (mention all, if more than one name)
Name: Mohammed A. khattab   Email: m.almukhttar@uomosul.edu.iq   Name: Ahmed abdalhameed   Email: ahmed.abdal-hameed@uomosul.edu.iq

8. Course Objectives

Course Objectives	In ENDWR404, initially students will learn how to estimation the quantities of materials for buildings and Earth works calculations for irregular cross-sections structural in additional structural drawing Upon successful completion of this course the student shall be able to: 1. Knowing the types of estimation and its benefits i 2. Excavation **i** 3. Foundations, stripe and raft **i** 4. Cubed wall works and estimation of materials. **i** 5. Block building, bricks building, stone building **i** 6. Wood form works **i** 7. Analysis Reinforced of slabs **ii** 8. Analysis Reinforced of beams **ii** 9. Design and Draw (Map of house+ foundation map+ section in wall) **ii** 10. Design and Draw (Reinforced of slab map) **ii** 11. Design and Draw (Reinforced of beam map) **ii** 12. Design and Analysis of Finishing works **ii**

9. Teaching and Learning Strategies

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

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Knowing the types of estimation and its benefits (i) Design and Draw Map of house (ii)	Introduction to Estimation and Materials Specification, Introduction; syllabus; Draw (house plan).	Theoretical lecture in class and lecture in the lab	HW
2	3	Excavation i Design and Draw (foundation map+ section in wall) **(ii)**	Excavation of Foundations Excavation of stripe and raft foundation, draw (elevations, sectional elevation, foundation plan, wall section).	Theoretical lecture in class and lecture in the lab	HW
3-4	6	Foundations, stripe and raft (i)	Foundations Estimation of (cement, sand, gravel) for stripe and raft foundation, draw (stair ways plan. reinforced of stair). Estimation of steel reinforced Estimation of steel reinforced for stripe and raft foundation, draw (slabs and beams).	Theoretical lectures in class and lectures in the lab	HW & Exam
5	3	Cubed wall works and estimation of materials. (i)	Cubed wall works Cubed wall works and estimation of materials	Theoretical lectures in class	HW
6-8	6	Block building, bricks building, stone building (i)	Walls stone building, bricks building, block building. Bricks building estimation of materials Block building, estimation of materials	Theoretical lectures in class	HW & Exam
9-10	6	Wood form works (i)	Wood form works estimation of materials for wood form types	Theoretical lectures in class	HW & Exam
11-13	6	Learn the basics of designing surface (open) and subsurface (covered) drainage sections. (ii)	Design of drains' sections	Theoretical lectures in class	HW & Exam
11-13	6	Analysis Reinforced of slabs (ii) Analysis Reinforced of beams (ii) Design and Draw (Reinforced of slab map) **(ii)** Design and Draw (Reinforced of beam map) **(ii)**	Reinforced estimation of materials for reinforced of slab. Reinforced of beams estimation of materials for reinforced of beams, draw (reinforced of Structural construction)	Theoretical lectures in class and lectures in the lab	HW
14-15	6	Design and Analysis of Finishing works (ii)	Finishing works Estimation of materials for finishing works	Theoretical lectures in class	HW

11. Course Evaluation

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

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	• VANZIRANI, V.N., CHANDOLA, S.P. "Civil Engineering Estimating and Costing ". first edition, 1982.
Main references (sources)	• Civil Engineering and Costing, S.P. Mahajan, 624. 1042, M214. • 3. Estimating Building and Construction, 692.5, H816, 73-119.
Recommended books and references (scientific journals, reports…)	--------------
Electronic References, Websites	--------------

Course Description Form

1. Course Name
Earth and Earth Rock Fill Dams
2. Course Code:
DWRE 413
3. Semester / Year
Spring semester / 2024-2025
4. Description Preparation Date
31/8/2023
5. Available Attendance Forms:
Theoretical lectures in class
6. Number of Credit Hours (Total) / Number of Units (Total)
2/2
7. Course administrator's name (mention all, if more than one name)
Name: Yousif Hashim Abdullah Al-Aqeeli Email: y.alaqeeli@uomosul.edu.iq Name: Ali Ahmed Abdulmawjood Email: aliabdulmawjood@uomosul.edu.iq
8. Course Objectives

Course Objectives	• Formulate a preliminary design of an earth dam. (ii)
	• An ability to specify the problems of seepage through the body of an earth dams. (i), (ii)
	• An ability to specify the problems of seepage through the foundation of an earth dams. (i), (ii)

9. Teaching and Learning Strategies

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

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Earth and Rock fill Dams	Earth and Rock fill Dams	Theoretical lectures in class	Exame
1	2	Earth and Rock fill Dams (Foundation for earth da Suit available materials)	Earth and Rock fill Dams	Theoretical lectures in class	Exame
1	2	Earth and Rock fill Dams (Modes of failure in earth dams)	Earth and Rock fill Dams	Theoretical lectures in class	Exame
1	2	Earth and Rock fill Dams (Location of a phreatic line)	cation of a phreatic line	Theoretical lectures in class	Exame
1	2	Earth and Rock fill Dams (Design Consideration of an Earth Dams)	Design Consideration	Theoretical lectures in class	HW and Exame
2	4	Earth and Rock Fill Dam (SEEPAGE CONTROL A Seepage Control through the body of the Dam)	EPAGE CONTROL	Theoretical lectures in class	Exame
2	4	Earth and Rock fill Dams (SEEPAGE CONTROL E Seepage Control Throug the Foundation)	EPAGE CONTROL	Theoretical lectures in class	Exame
1	2	Earth and Rock fill Dams (Stability of Slopes)	Stability of Slopes	Theoretical lectures in class	HW and Exame

2	4	Earth and Rock fill Dams ((Swedish) Standard Method of Slices)	Stability of Slopes	Theoretical lectures in class	HW and Exame
1	2	Spillway (Component of spillways, Types of spillways)	Spillway	Theoretical lectures in class	Exame
1	2	Spillway (Design Principl of Ogee Spillway)	Spillway	Theoretical lectures in class	HW and Exame

11. Course Evaluation

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

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	1. Hydraulics of Dams and Reservoirs, By: Fuat Senturk, W Resources Publications, Colorado, U.S.A.,1994. 2. Theory and Design of Irrigation Structures, Vol. II, By: R Varshney, S. C. Gupta and R. L. Gupta, Nem Chand & B Roorkee (U.P.), India,1982. 3. Earth-Rock Dams, Engineering Problems of Design Construction, By: J. L. Sherard, R. J. Woodward, S. Gizienske and W. A. Clevenger, John Wiley and Sons, Inc., N York, 1963. 4. Engineering for Dams, By: W. P. Greager, J. D. Justin an Hinds, In three Volumes, John Wiley and Sons, Inc., New Y 1961.
Main references (sources)	--------------
Recommended books and references (scientific journals, reports…)	Loucks, D. P., Van Beek, E., Stedinger, J. R., Dijkman, J. P., Villars, M. T. (2005). Water Resources Systems Planning Management: An Introduction to Methods, Models Applications. Paris, UNESCO.
Electronic References, Websites	---------------

Course Description Form

1. Course Name:
Foundation Engineering of Hydraulic Structure

2. Course Code:
DWR 450

3. Semester / Year:
Spring semester (second) / 2023 -2024

4. Description Preparation Date:
1/4/2024

5. Available Attendance Forms:
Class lectures + Electronic lectures

6. Number of Credit Hours (Total) / Number of Units (Total)
30 hours/ 2 credits

7. Course administrator's name (mention all, if more than one name)
Name: **I. M. A. Al-kiki**   Email: **i.alkiki@uomosul.edu.iq**   **Dr.Zuheir Karabash**   Email: **karabash@uomosul.edu.iq**

8. Course Objectives

Course Objectives	− **The optimal, good, economical and safe design of engineering pedestrian foundations (deep foundations) in terms of the student's familiarity with:** • **Types of piles foundations.** • **Bearing capacity of piles.** • **Analysis and distribution of stresses on piles.** • **Structural design of foundations** − **Soil bearing capacity.**

9. Teaching and Learning Strategies

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

10. Course Structure

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

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

15	2	Knowledge of structural design for (pile caps and reinforcement footing)	The structural design of foundations	Lecture in class	First course examination No.2

11. Course Evaluation

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

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	- الشكرجي ، يوسف والمحمدي، نوري، " هندسة الأسس " ، جامعة بغداد ،الطبعة الاولى، 1985
Main references (sources)	-Das, B. M., "Principle of Foundation Engineering ", Thomson Books/Cole, California State University, Sacramento, 5th ed., 2004. - Peak, R. B., Hanson, W. E. and Thorburn, T.H., " Foundation Engineering ", John Wiley and Sons, 2nd ed., 1974 - Bowles, J.E., P.E., S.E." Foundation Analyses and Design ", The McGraw-Hill Companies, Inc, 5th ed., 2006. -Das, B. M., & Sivakugan, N.," Principles of foundation engineering", Cengage learning, 2018.
Recommended books and references (scientific journals, reports…)	20. Al-Rafidain Engineering Journal. 21. Highway Research Record , H R R. 22. Journal of the Geo technical engineering Division , ASCE. 23. Journal of Soil Mechanics and Foundation Division, Proc. ASCE. 24. Transportation Research Record , TRR. 25. Journal of the Japan Society of Civil Engineering , JSCE. 26. The Quarterly Journal of Engineering Geology.
Electronic References, Websites	None

Course Description Form

1. Course Name:
Sediment Transport
2. Course Code:
DWR 451
3. Semester / Year:
2/ 2024−2025
4. Description Preparation Date:

	13/4/2024

5. Available Attendance Forms:
In-person

6. Number of Credit Hours (Total) / Number of Units (Total)
2/2

7. Course administrator's name (mention all, if more than one name)
Name: Nashwan Kamal Aldeen Mohammed Email: nashwan.alomari@uomosul.edu.iq

8. Course Objectives

Course Objectives	
	• To introduce the students to sediment transport, sediment properties, and sediment measurement. • To understand the rivers' morphology and rivers' classification. At the end of the course, the students will have a working knowledge of the sediment transport fundamentals. This will be achieved through descriptive lectures.

9. Teaching and Learning Strategies

Strategy	
	The primary strategy that will be adopted in delivering this module is to encourage students' participation in classes, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, homework, and interactive tutorials. PowerPoint presentations and boards are used in the classroom. Examples and problems will be solved and illustrated on the classroom board. Tutorials are also organized to establish closer contact with students.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1-2	4	Recognize the common characteristics of the rivers' morphology.	• Introduction • River morphology	Presentation	
3-4	4	Understand sediment properties and its effect on sediment transport	Properties of the sediment	Presentation & whiteboard	Quiz1
5, 6, and 7	6	Recognize the sediment motion and how it begins	Beginning of sediment motion	Presentation & whiteboard	Assignment, and Quiz2

8, 9, 10, 11 and 12	10	Apply the basic concepts of sciences and engineering to solve issues associated with sediment transport problems	• Sedimentary Bedforms • Resistance to Flow.	Presentation & whiteboard	H.W, and Monthly exam
13, 14, and 15	6	Gain the knowledge to deal with sediment problems	Measurement of sediment discharge.	Presentation & whiteboard	Term exam

5. Course Evaluation

Evaluation type	Degree
2 Quizzes	10
Assignment and H.W	5
Monthly Exam	10
Term Exam	15
Final Exam	60
Total	100

6. Learning and Teaching Resources

Required textbooks (curricular books, if any)	1. Simons, D. B., & Şentürk, F. (1992). Sediment transport technology: Water and sediment dynamics. Littleton, Colorado: Water Resources Publication.
Main references (sources)	9. Dey, S. (2014). Fluvial Hydrodynamics: Hydrodynamics and Sediment transport phenomena. Berlin: Springer. 10. Vanoni, V. A. (2006). Sedimentation Engineering. New York: ASCE Publications. 11. Yalin, M. S. (1977). Mechanics of Sediment Transport. Pergamon Press.
Recommended books and references (scientific journals, reports…)	None
Electronic References, Websites	None

Course Description Form

1. Course Name:
Water supply system

2. Course Code:
DWR 493

3. Semester / Year:

2/2024−2025					

4. Description Preparation Date:
1/9/2023

5. Available Attendance Forms:
Theoretical lectures in class

6. Number of Credit Hours (Total) / Number of Units (Total)
2/2

7. Course administrator's name (mention all, if more than one name)
Name: Mohammed A. khattab   Email: m.almukhttar@uomosul.edu.iq
Name: Ahmed abdalhameed   Email: ahmed.abdal-hameed@uomosul.edu.iq

8. Course Objectives	
Course Objectives	On successful completion of this course students will be able to:
	Recognize the common types of networks to supply water in a city (i)
	Recognize the common limitations and requirements to supply water (i)
	Apply the basic concepts of sciences and engineering to solve issues associated with small networks(i)
	Formulate the main parameter to affect the networks of supplying water, fitting and pumps(ii)

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

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1-2	4	Recognize the common types of networks to supply water in a city (i)	Introduction to the main types of city supply systems, with limitations	Theoretical lectures in class	HW
3-4	4	Recognize the common limitations and requirements to supply water (i)	Measuring the required to supply water, discharge and pressure.	Theoretical lectures in class	HW
5	2	Recognize the common limitations and requirements to supply water (i)	Identify the main usage for each type of the networks	Theoretical lectures in class	Exam
6-7	4	Apply the basic concepts of sciences and engineering to solve issues associated with small networks(i)	Minor losses of the fittings	Theoretical lectures in class	HW
8-9	4	Apply the basic concepts of sciences and engineering to solve issues associated with small networks(i)	Connect pipes in parallel and series	Theoretical lectures in class	HW

10-11	4	Apply the basic concepts of sciences and engineering to solve issues associated with small networks(i)	Branched channel, connect with tanks	Theoretical lectures in class	Exam
12-13	4	Formulate the main parameter to affect the networks of supplying water, fitting and pumps(ii)	Hardy- cross method to measure discharge in each pipe of a networks	Theoretical lectures in class	HW
14-15	6	Formulate the main parameter to affect the networks of supplying water, fitting and pumps(ii)	Pumps: connections and efficiency	Theoretical lectures in class	HW

11. Course Evaluation

Evaluation type	Degree
H W (each 2 pt)	12
Two Monthly exam(each 14 pt)	28
Final Exam	60
Total	100

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	• Mays, L.W., 2000. Water distribution system handbook. McGraw-Hill Education.
Main references (sources)	• McGhee, T.J. and Steel, E.W., 1991. Water supply and sewerage (Vol. 6). New York: McGraw-Hill.
Recommended books and references (scientific journals, reports…)	--------------
Electronic References, Websites	--------------