Ministry of Higher Education and Scientific Research
Scientific Supervision and Scientific Evaluation Apparatus
Directorate of Quality Assurance and Academic Accreditation
Accreditation Department

Academic Program and Course Description Guide

2024

Introduction:

The educational program is a well-planned set of courses that include procedures and experiences arranged in the form of an academic syllabus. Its main goal is to improve and build graduates' skills so they are ready for the job market. The program is reviewed and evaluated every year through internal or external audit procedures and programs like the External Examiner Program.

The academic program description is a short summary of the main features of the program and its courses. It shows what skills students are working to develop based on the program's goals. This description is very important because it is the main part of getting the program accredited, and it is written by the teaching staff together under the supervision of scientific committees in the scientific departments.

This guide, in its second version, includes a description of the academic program after updating the subjects and paragraphs of the previous guide in light of the updates and developments of the educational system in Iraq, which included the description of the academic program in its traditional form (annual, quarterly), as well as the adoption of the academic program description circulated according to the letter of the Department of Studies T 3/2906 on 3/5/2023 regarding the programs that adopt the Bologna Process as the basis for their work.

In this regard, we can only emphasize the importance of writing an academic programs and course description to ensure the proper functioning of the educational process.

Concepts and terminology:

Academic Program Description: The academic program description provides a brief summary of its vision, mission and objectives, including an accurate description of the targeted learning outcomes according to specific learning strategies.

Course Description: Provides a brief summary of the most important characteristics of the course and the learning outcomes expected of the students to achieve, proving whether they have made the most of the available learning opportunities. It is derived from the program description.

Program Vision: An ambitious picture for the future of the academic program to be sophisticated, inspiring, stimulating, realistic and applicable.

Program Mission: Briefly outlines the objectives and activities necessary to achieve them and defines the program's development paths and directions.

Program Objectives: They are statements that describe what the academic program intends to achieve within a specific period of time and are measurable and observable.

Curriculum Structure: All courses / subjects included in the academic program according to the approved learning system (quarterly, annual, Bologna Process) whether it is a requirement (ministry, university, college and scientific department) with the number of credit hours.

Learning Outcomes: A compatible set of knowledge, skills and values acquired by students after the successful completion of the academic program and must determine the learning outcomes of each course in a way that achieves the objectives of the program.

Teaching and learning strategies: They are the strategies used by the faculty members to develop students' teaching and learning, and they are plans that are followed to reach the learning goals. They describe all classroom and extra-curricular activities to achieve the learning outcomes of the program.

Academic Program Description Form

University Name: Mosul University

Faculty/Institute: College of Engineering

Scientific Department: Dams and Water Resources Engineering

Academic or Professional Program Name: Dams and Water Resources Engineering

Final Certificate Name: BSc. of science in Dams and Water Resources Engineering

Academic System: Modulus+ Course System + Bologna Process

Description Preparation Date: March, 2024

File Completion Date: March, 2024

جامعة الموصل - كلية الهندسة
قسم هندسة السدود والموارد المائية

Signature:

Head of Department Name:

Dr. Omar Muqdad Abdulgany

Date: 27/8/2024

Signature:

Scientific Associate Name:

Dr. Ayman T. Hameed

Date: 27/8/2024

The file is checked by: Abdulrahman Han Taha

Department of Quality Assurance and University Performance

Director of the Quality Assurance and University Performance Department:

Date: 27/8/2024

Signature:

Approval of the Dean

Approval of the Dean

1. Program Vision

The vision of Dams and Water Resources Department (DWR) is to be a pioneer and leader in water development studies in Iraq and plays essential role in controlling these studies and investing them in the field of irrigation and electrical generation, storage and distribution of water in dam reservoirs and water resources engineering. DWR aims to achieve an advanced level of education in the field of dam engineering, water resources that meet the country's need for engineering alumni to secure the completion of future plans in the fields of work in which the department's specialization is part of it.

2. Program Mission

1- Qualify competent engineers to work in the field of water resources.

2- Prepare alumni with distinct capabilities to meet the current and future challenges related to the optimal use of water resources and face the drought phenomenon.

3- Provide the country and society with specialists who hold higher degrees in the hydraulic, hydrological and irrigation specialties to benefit from their scientific expertise.

4- Develop students 'performance and strategies to deal with real world problems through constructive and advanced scientific thinking.

5- Adopt the distinguished and creative ideas of students and encouraging them to work as a team.

6- Maintain communication with department's alumni through inviting them to seminars, scientific conferences, and continuing education programs.

3. Program Objectives

1. Provide well qualified graduates with considerable practice and scientific foundations in the aspects of the water resources subjects to serve and participate in achieving the needs and goals of the socio-economic development of the country.
2. The graduates were able to analyze and design the hydraulic and irrigation structures. In addition, to evaluate these projects by using modern specialized programs or built physical models.
3. Providing graduates with basic skills in managing projects, solving problems, and reports preparation related to water resources projects.
4. To provide the graduates with skills and scientific bases to be able to continue in higher education.
5. Sharing and expanding our potential by communicating with the related international educational institutions, such as universities and research centers, to add and enhance our expertise of institutions.

4. Program Accreditation

The Program is under review by the National Council for Accreditation of Engineering Education (ICAEE)

5. Other external influences

Deanship of Engineering College

6. Program Structure

Program Structure	Number of Courses	Credit hours	Percentage	Reviews*
Institution Requirements	12	19	13	
College Requirements	12	24	16	

Department Requirements	56	105	71	
Summer Training	1	….		
Other				

7. Program Description

First Level

Semester 1 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
DWRE 111	Mathematics I	93	82	**7.00**	B	
DWRE 112	Engineering Mechanics I	93	82	**7.00**	B	
DWRE 113	Engineering Drawing	93	57	**6.00**	B	
DWRE 114	Human Rights and Democracy	33	17	**2.00**	B	
DWRE 115	Introduction to Water Resources Engineering	63	37	**4.00**	C	
DWRE 116	Hydrogeology	63	37	**4.00**	S	

Semester 2 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
DWRE 121	Mathematics II	93	82	**7.00**	B	DWRE 111
DWRE 122	Engineering Mechanics II	78	72	**6.00**	B	DWRE 112
DWRE 123	Computer Drawing	93	57	**6.00**	B	
DWRE 124	Engineering Statistics	63	62	**5.00**	B	
DWRE 125	Water Quality and Pollution	63	37	**4.00**	S	
DWRE 126	English I	33	17	**2.00**	S	

Second Level

First semester					
Credit	applied	practical	Theoretical	**subject**	**Code**
3	1	–	3	Mathematics III	DWR201
3	–	2	2	Matlab I	DWR202
3	-	2	2	Soil Physics	203 DWR
3	1	-	3	Fluid Mechanics 1	204 DWR
2	1	-	2	Strength of Material I	205 DWR
3	-	2	2	Building construction	206 DWR
3	1	2	2	Surveying I	207 DWR
2	-	-	2	The crimes of the Baath regime in Iraq	
22	4	8	18	sum	
	28			Number of weekly study hours	

second semester					
Credit	applied	practical	Theoretical	**subject**	**Code**
3	1	–	3	Mathematics IV	DWR208
3	–	2	2	Matlab II	DWR209
3	–	2	2	Water management and land reclamation	DWR210
4	1	2	3	Fluid Mechanics II	DWR211
2	1	–	2	Strength of Material II	DWR212
3	–	2	2	Construction Materials Technology	DWR213
3	1	2	2	Surveying II	DWR214
21	4	10	16	sum	
	30			Number of weekly study hours	

Third Level

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

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

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.

Fourth Level

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

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

8. Expected learning outcomes of the program

Knowledge	
Learning Outcomes (**A**)	i. An ability to distinguish identify, define, formulate, and solve engineering problems by applying principles of engineering, science and mathematics. (i) ii. An ability to produce engineering designs that meet desired needs within certain constraints by applying both analysis and synthesis in the design process. (ii) iii. An ability to perceive the continual necessity for professional knowledge growth and how to find, assess, assemble and apply it properly. (vi)
Skills	
Learning Outcomes (**B**)	i. 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. (iii) ii. An ability to skillfully communicate orally with a gathering of people and in writing with various managerial levels. (iv) iii. An ability to work adequately on teams and to set up objectives, plan activities, meet due dates, and manage risk and uncertainty. (vii)
Ethics	
Learning Outcomes (**C**)	i. An ability to perceive ethical and professional responsibilities in engineering cases and make brilliant judgments taking into account the consequences in worldwide financial, ecological and societal considerations. (v) ii. An ability to work adequately on teams and to set up objectives, plan activities, meet due dates, and manage risk and uncertainty. (vii)

9. Teaching and Learning Strategies

- Power point lectures
- Whiteboard Lectures
- Tutorial
- Laboratory experiments
- Computer laboratories
- Video lectures
- Team works
- Case Studies
- On-line lectures

10. Evaluation methods

- Mid-Term and Final exams
- Quizzes
- Technical Reports and Projects
- Laboratory Reports and Exams

11. Faculty

Faculty Members

Academic Rank	Specialization		Special Requirements/Skills (if applicable)		Number of the teaching staff	
	General	Special			Staff	Lecturer
Professor	Civil Engineering	Soil Mechanic			1	
Assist. Professor	Water Resources Engineering	Irrigation and Drainage			1	

Assist. Professor	Water Resources Engineering	Hydraulic			2	
Assist. Professor	Water Resources Engineering	Hydrology			2	
Lecturer	Civil Engineering	Structural Engineering			1	
Lecturer	Dams and Water Resources Engineering	Irrigation and Drainage			2	
Lecturer	Water Resources Engineering	Hydraulic			4	
Lecturer	Water Resources Engineering	Hydrology			4	
Lecturer	Civil Engineering	Soil Mechanic			3	
Lecturer	Agriculture	Soil Physics			1	
Assist. Lecturer	Computer Engineering	Computer Engineering			1	
Assist. Lecturer	Dams and Water Resources Engineering	Hydraulic			5	
Assist. Lecturer	Dams and Water Resources Engineering	Hydrology			4	
Assist. Lecturer	Dams and Water	Irrigation and Drainage			2	

	Resources Engineering					
Lecturer	Agriculture	Soil Physics			1	
Assist. Lecturer	Computer Engineering	Computer Engineering			1	

Professional Development

Mentoring new faculty members

The academic program is designed to comprehensively enhance the knowledge and skills of new faculty members across various educational fields. It begins by focusing on equipping faculty with the fundamental ability to effectively manage their courses. It then progresses to encompass the processes and procedures necessary to ensure the successful achievement of targeted learning outcomes in diverse programs.

To achieve these goals, the program includes the following key components:

1. **Educational Courses**: New faculty members participate in educational courses aimed at improving the quality of the educational learning process. These courses cover a range of topics, including:
    - **Training on Teaching Methods**: Instruction on effective strategies for engaging students and delivering course content.
    - **Designing Course Outlines**: Guidance on structuring and organizing course materials to optimize student learning.
    - **Modern Trends in University Teaching**: Exploration of innovative approaches to teaching and learning in higher education.
    - **Evaluating Student Learning**: Techniques for assessing student performance and understanding.
    - **Preparing Tests**: Strategies for creating fair and rigorous assessments.
    - **University Policies**: Familiarization with relevant laws, regulations, instructions, and e-learning platforms.
2. **Continuous Evaluation**: Faculty members, both full-time and part-time, undergo continuous evaluation to identify areas for development throughout their educational careers. This process helps ensure that faculty are continually improving and adapting to meet the evolving needs of students and the university.

3. **Professional Development Opportunities:** Faculty members are encouraged to participate in teaching staff development courses offered by the department or the university's continuing education unit. These courses provide opportunities for faculty to enhance their skills, stay current with trends in education, and collaborate with colleagues.

Professional development of faculty members

Continuous Learning Committee of Dams and Water Resources Engineering Department organizes lectures and workshops for faculty members in various fields. The professional development activities held in the past five academic years are listed as follows:

- ✓ Development of education methods and E-learning/ 9
- ✓ Scientific publications/44
- ✓ Academic accreditation/2
- ✓ Miscellaneous seminars in the water resources engineering field/47
- ✓ Participation in conferences, seminars, workshops, and training courses outside Iraq/2
- ✓ Participation in conferences, seminars, workshops, and training courses inside Iraq/26

The faculty members actively participate in various workshops and training courses that fit their teaching, quality, and research skills. Last three academic years, 15 faculty members presented a total skills development (34 workshops/16 continuous education courses). The department encourages faculty members to attend conferences, seminars, workshops, and training courses for professional development.

12. Acceptance Criterion

To be eligible for admission to the Dams and Water Resources Department at the undergraduate level, applicants must meet certain requirements. The admissions process is overseen by the Ministry of Higher Education and Scientific Research, which electronically manages and allocates student admissions to government institutions and faculties based on their secondary school grades. Here are some of the key requirements for student acceptance:

A- Iraqi Nationality and Year of Birth: Applicants must hold Iraqi nationality and be born in 1999 or later.

B- Iraqi Secondary School Certificate: Applicants need to possess a certificate issued by an Iraqi secondary school that is authorized by the Ministry of Education.

C- Medical Certificate: Applicants must provide a medical certificate to demonstrate that they meet the necessary health requirements.

D- Full-Time Student: Applicants should commit to being full-time students, dedicating their time and efforts to their studies in the department.

E- Not acceptable and continues to study in another college.

F- Non-Iraqi students (arrivals) who obtained a certificate of an Iraqi secondary school admitted according to the central acceptance.

G- Admission 10% of the top graduates of technical institutes.

H- Acceptance of talented students.

13. The most important sources of information about the program

- Guidebook for Mosul University The departmental website:https://uomosul.edu.iq/engineering/%d9%87%d9%86%d8%af%d8%b3%d8%a9-%d8%a7%d9%84%d8%b3%d8%af%d9%88%d8%af-%d9%88%d8%a7%d9%84%d9%85%d9%88%d8%a7%d8%b1%d8%af-%d8%a7%d9%84%d9%85%d8%a7%d8%a6%d9%8a%d8%a9/

14. Program Development Plan

To enhance the quality of education, elevate graduate outcomes, and meet the competencies required by increasingly complex societies, the department council has decided to adopt the "Bologna process system of Education." This system incorporates the European Credit Transfer and Accumulation System (ECTS) instead of the traditional course-based system, aligning with the department's commitment to continuous improvement. The new system will be implemented starting in the academic year 2023-2024.

The adoption of the Bologna process is expected to yield several benefits:

- **Student-Centered Learning**: The system places students at the core of the learning process, enhancing the overall education system.
- **Increased Class Interaction**: The constant engagement between teachers and students promotes a more dynamic learning environment.
- **Focus on Professional and Practical Skills**: Emphasis is placed on acquiring practical skills relevant to professional development.
- **Opportunity for Continuous Learning**: Students will have the opportunity for ongoing learning, assessment, and feedback.
- **Biannual Performance Evaluation**: The system allows for the evaluation of student performance twice a year, providing more comprehensive feedback.
- **Enhanced Subject Understanding**: The system is expected to facilitate a deeper understanding of subjects among students.

Program Skills Outline											
				Required program Learning outcomes							
Year/Level	Course Code	Course Name	Basic or optional	Knowledge			Skills			Ethics	
				i	ii	vi	iii	iv	vii	v	vii
1	DWRE 111	Mathematics I	Basic	*	*						
	DWRE 112	Engineering Mechanics I	Basic	*	*				*		
	DWRE 113	Engineering Drawing	Basic	*	*						
	DWRE 114	Human Rights and Democracy	Basic							*	
	DWRE 115	Introduction to Water Resources Engineering	Basic	*			*				
	DWRE 116	Hydrogeology	Basic	*			*			*	
	DWRE 121	Mathematics II	Basic	*	*						
	DWRE 122	Engineering Mechanics II	Basic	*	*						
	DWRE 123	Computer Drawing	Basic	*	*			*			
	DWRE 124	Engineering Statistics	Basic	*	*						
	DWRE 125	Water Quality and Pollution	Basic	*			*				
	DWRE 126	English I	Basic							*	

Program Skills Outline												
First Semester				Required program Learning outcomes								
Year/Level	Course Code	Course Name	Basic or optional	Knowledge			Skills			Ethics		
				i	ii	vi	iii	iv	vii	v	vii	
2	ENGC 227	Statistics	Basic	*								
	DWR 240	Calculus III	Basic	*	*							
	DWR 241	Fluid Mechanics I	Basic	*	*							
	DWR 242	Engineering Surveying I	Basic	*	*				*			
	DWR 243	Building Construction	Basic	*	*							
	DWR 244	Strength of Materials I	Basic	*	*			*				
	DWR 245	Soil Physics	Basic	*			*			*		
	DWR 246	Computer Programming (Matlab)	Basic	*	*			*				
	DWR 290	Water Resource Projects in Iraq	Basic	*	*							
	DWR 291	Remote Sensing and GIS applications	Basic		*				*			

Program Skills Outline											
Second Semester				Required program Learning outcomes							
Year/Level	Course Code	Course Name	Basic or optional	Knowledge			Skills			Ethics	
				i	ii	vi	iii	iv	vii	v	vii
2		English Language - Pre Intermediate	Basic					*		*	
	UOMC 104	Professional Ethics	Basic			*				*	
	ENGE 229	Public Safety	Basic			*				*	
	DWR 247	Calculus IV	Basic	*	*						
	DWR 248	Fluid Mechanics II	Basic	*	*						
	DWR 249	Engineering Surveying II	Basic	*			*				
	DWR 250	Construction Material Technology	Basic	*	*						
	DWR 251	Water Management and Land Reclamation	Basic	*			*			*	
	DWR 252	Hydrogeology	Basic	*			*		*	*	*
	DWR 253	Strength of Materials II	Basic	*	*						

Program Skills Outline												
				Required program Learning outcomes								
Year/Level	Course Code	Course Name	Basic or optional	Knowledge			Skills			Ethics		
				i	ii	vi	iii	iv	vii	v	vii	
3	DWR 340	Engineering Analysis	Basic	*	*							
	DWR 341	Hydraulics	Basic	*	*			*				
	DWR 342	Surface Hydrology	Basic	*	*					*		
	DWR 343	Irrigation Principles and Practices	Basic	*	*				*			
	DWR 344	Theory of Structures I	Basic	*			*					
	DWR 345	Concrete Design	Basic	*	*							
	DWR 346	Soil Mechanics I	Basic	*	*							
	DWR 347	Computer Applications in Water Resources I	Basic	*	*							
	DWR 391	River Mechanics	optional	*	*						*	
	DWR 394	Statistical Methods in Hydrology	optional	*	*							

Program Skills Outline												
				Required program Learning outcomes								
Year/ Level	Course Code	Course Name	Basic or optional	Knowledge			Skills			Ethics		
				i	ii	vi	iii	iv	vii	v	vii	
3	-	English Language - Intermediate	Basic					*				
	ENGE320	Numerical Analysis	Basic	*	*		*					
	DWR 348	Open Channels and Hydraulic Machines	Basic	*	*	*	*					
	DWR 349	Groundwater Hydrology	Basic	*	*							
	DWR 350	Drainage Engineering	Basic	*	*			*	*		*	
	DWR 351	Soil Mechanics II	Basic	*	*				*		*	
	DWR 352	Consumptive Use and Water Duty	Basic	*			*					
	DWR 392	Theory of Structures II	optional	*			*					
	DWR 393	Reinforced Concrete Design	optional	*	*							
	DWR 395	Field Flow Measurements and Analysis	optional	*	*							
	DWR 396	Computer Applications in Water Resources II	optional	*	*							

Program Skills Outline												
				Required program Learning outcomes								
Year/ Level	Course Code	Course Name	Basic or optional	Knowledge			Skills			Ethics		
				i	ii	vi	iii	iv	vii	v	vii	
4	-	English language – Upper Intermediate	Basic						*			
	ENGC 425	Engineering Management	Basic	*	*					*		
	DWR 440	Design of Hydraulic Structures I	Basic	*	*		*					
	DWR 441	Design and Gravity Irrigation Systems	Basic	*	*			*				
	DWR 442	Design of Irrigation and Drainage Networks	Basic	*	*							
	DWR 443	Design of Gravity and Arch Dams	Basic	*	*			*				
	DWR 444	Foundation Engineering	Basic	*	*							
	DWR 445	Graduation Project I	Basic	*	*		*	*		*	*	
	DWR 490	Linear Algebra	optional	*	*				*			
	DWR 491	Operation Research	optional	*	*				*			

Program Skills Outline												
				Required program Learning outcomes								
Year/ Level	Course Code	Course Name	Basic or optional	Knowledge			Skills			Ethics		
				i	ii	vi	iii	iv	vii	v	vii	
4	ENGC426	Engineering Economic	Basic	*	*		*					
	DWR 446	Design of Hydraulic Structures II	Basic	*	*		*		*		*	
	DWR 447	Design of Sprinkler and Drip Irrigation System	Basic	*	*	*						
	DWR 448	Estimations and Specifications	Basic	*	*							
	DWR 449	Earth and Earth Rock Fill Dams	Basic	*	*		*					
	DWR 450	Foundation Engineering of Hydraulic Structures	Basic	*	*							
	DWR 451	Sediment Transport	Basic	*	*							
	DWR 452	Graduation Project II	Basic	*	*		*	*	*	*	*	
	DWR 492	Finite Elements	optional	*	*							
	DWR 493	Water Supply Engineering	optional	*	*							

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 (2023 - 2024)

جمهورية العراق - وزارة التعليم العالي والبحث العلمي

جامعة الموصل

بكالوريوس في هندسة السدود والموارد المائية (الدورة الأولى)

أربع سنوات (ثمانية فصول دراسية) - ٢٤٠ وحدة اوربية - كل وحدة اوربية = ٢٥ ساعة

المنهاج الدراسي للعام ٢٠٢٣-٢٠٢٤

Level	Semester	No.	Module Code	Module Name in English	اسم المادة الدراسية	Language	SSWL (hr/w)						Exam hr/sem	SSWL hr/sem	USSWL hr/sem	SWL hr/sem	ECTS	Module Type	Prerequisite Module(s) Code
							CL (hr/w)	Lect (hr/w)	Lab (hr/w)	Pr (hr/w)	Tut (hr/w)	Semn (hr/w)							
UGI	1	1	DWRE 111	Mathematics I	الرياضيات ا	English	3	1			2		3	93	82	175	7.00	B	
		2	DWRE 112	Engineering Mechanics I	الميكانيك الهندسي ا	English	2	1			2		3	78	72	150	6.00	B	
		3	DWRE 113	Engineering Drawing	الرسم الهندسي	English			6				3	93	57	150	6.00	B	
		4	DWRE 114	Human Rights and Democracy	حقوق الانسان والحريات	Arabic	2						3	33	17	50	2.00	B	
		5	DWRE 115	Introduction to Water Resources Engineering	مقدمة في هندسة الموارد المائية	Arabic	2	1					3	48	27	75	3.00	C	
		6	DWRE 116	computer	حاسوب	English	1		2				3	48	27	75	3.00	S	
		7	DWRE 117	Hydrogeology	هيدروجيولوجي	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	Semester	No.	Module Code	Module Name in English	اسم المادة الدراسية	Language	SSWL (hr/w)						Exam hr/sem	SSWL hr/sem	USSWL hr/sem	SWL hr/sem	ECTS	Module Type	Prerequisite Module(s) Code
							CL (hr/w)	Lect (hr/w)	Lab (hr/w)	Pr (hr/w)	Tut (hr/w)	Semn (hr/w)							
UGI	2	1	DWRE 121	Mathematics II	الرياضيات II	English	3	1			2		3	93	82	175	7.00	B	
		2	DWRE 122	Engineering Mechanics II	الميكانيك الهندسي II	English	2	1			2		3	78	72	150	6.00	B	
		3	DWRE 123	Computer Drawing	الرسم بواسطة الحاسوب	English			6				3	93	57	150	6.00	B	
		4	DWRE 124	Engineering Statistics	الإحصاء الهندسي	English	1				2		3	48	52	100	4.00	B	
		5	DWRE 125	Water Quality and Pollution	نوعية المياه والتلوث	Arabic	1		2				3	48	27	75	3.00	S	
		6	DWRE126	Arabic	اللغة العربية	English	2						3	33	17	50	2.00	S	
		7	DWRE 127	English I	اللغة الانكليزية ا	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		

Note: The student should complete 4 weeks of Summer Internships to fullfil the requirements of the Bachelor's degree

Structured SWL (hr/w) type		
	CL	Class Lecture
	Lab	Laboratory
	Pr	Practical Training
	Tut	Tutorial
	Lect	Online lecture
	Semn	Seminar

Module type		
	B	Basic learning activities
	C	Core learning activity
	S	Suport or related learning activit
	E	Elective learning activity

SWL:	Student Workload
SSWL:	Structured SWL
USSWL:	Unstructured SWL

Note: Columns O, Q and R are progrmaed, protected and should not be edited

Course Description Form

1. Course Name:
Mathematics I
2. Course Code:
DWRE 111
3. Semester / Year:
First/ 2023−2024
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 shel	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:
2/2023-2024
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/ 2023-2024	
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/ 2023-2024	
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

13. Course Name:	
hydrogeology	
14. Course Code:	
DWRE 117	
15. Semester / Year:	
1/2023−2024	
16. Description Preparation Date:	
1/9/2023	
17.Available Attendance Forms:	
Theoretical lectures in class and on line	
18.Number of Credit Hours (Total) / Number of Units (Total)	
3/3	
19. 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	
20. 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
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, 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.
22. 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		

23. Course Evaluation

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

24. 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 / 2023-2024
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/ 2023−2024

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 involv logarithmic and exponential functions, Graphs and applications involving logarithmic and exponer functions, Hyperbolic functions, Hopital's Rule, An overview of integration methods: Trigonome substitutions, Trigonometric integral, Integration by parts, Integrating rational functions by partial fracti Numerical integration; Simpson's rule and Improper integrals.

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 p 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:
2023-2024
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	-

11. Course Evaluation

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

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Engineering mechanics – dynamic, Alanaz, H., Ministry of higher education, 1990.
Main references (sources)	• 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 / 2023-2024
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:
2/2023-2024
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:
2/2023−2024
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 t 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

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 shou 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:
2/2023−2024
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 anda 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

First semester					
Credit	applied	practical	Theoretical	**subject**	**Code**
3	1	–	3	Mathematics III	DWR201
3	–	2	2	Matlab I	DWR202
3	-	2	2	Soil Physics	DWR 203
3	1	-	3	Fluid Mechanics 1	DWR 204
2	1	-	2	Strength of Material I	DWR 205
3	-	2	2	Building construction	DWR 206
3	1	2	2	Surveying I	DWR 207
2	-	-	2	The crimes of the Baath regime in Iraq	
22	4	8	18	sum	
	28			Number of weekly study hours	

second semester					
Credit	applied	practical	Theoretical	**subject**	**Code**
3	1	–	3	Mathematics IV	DWR208
3	–	2	2	Matlab II	DWR209
3	–	2	2	Water management and land reclamation	DWR210
4	1	2	3	Fluid Mechanics II	DWR211
2	1	–	2	Strength of Material II	DWR212
3	–	2	2	Construction Materials Technology	DWR213
3	1	2	2	Surveying II	DWR214
21	4	10	16	sum	
	30			Number of weekly study hours	

Course Description Form

1. Course Name:
Mathematics III
2. Course Code:
DWRE 211

3. Semester / Year:	
First/ 2023-2024	
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)	
4/2	
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	○ Understanding of the fundamental concepts of polar coordinates system (i) ○ Used polar coordinates system to calculate the area and curve length (ii) ○ Define vector and unite vector (i) ○ Apply the principle of scalar and vector products to solve some problems (ii) ○ Using vector approach to find plane equation and line equation (ii) ○ Using vector approach to find the angle between plane (ii)
9. Teaching and Learning Strategies	
Strategy	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.

	The course objects demonstrate sequence in mathematics III primarily for students intending to major 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	12	Understanding of the fundamental concepts of polar coordinates system	Introduction to polar coordinate system and Symmetry of polar coordinate graphs	A lecture in class	H.W, C.W and Exam
4-6	12	Used polar coordinates system to calculate the area and curve length	area and length in polar coordinate system	A lecture in class	H.W, C.W and Exam
7-9	8	Define vector	Vector component and the length of the vec vector in space	A lecture in class	H.W, C.W and Exam
10-12	12	Apply the principle of scalar and vector products to solve some problems	Product of two vectors (The scalar product), Vector projections; Orthogonal vectors	A lecture in class	H.W, C.W and Exam
13-15	12	Apply the principle of scalar and vector products to solve some problems	Lines in the plane and distance from points, The cross products (vector product), Equation of lines and planes, Angles between planes	A lecture in class	H.W, C.W and Exam

11. Course Evaluation

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)	"Calculus". Ross L Finney and George B. Thomas. Copyright by Addison Wesley Publishing Company, 1990.
Main references (sources)	"THOMAS CALCULUS" George B. Thomas. Printed in the United States of America., 2014.
Recommended books and references (scientific journals, reports…)	_____
Electronic References, Websites	_____

Course Description Form

1. Course Name:
Computer programming (Mat Lab I)
2. Course Code:
DWRE 215
3. Semester / Year:
1/2023-2024
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)
4/2
7. Course administrator's name (mention all, if more than one name)
Omar Kanan Taha Email: omar.alsultan@uomosul.edu.iq Ali Ahmed Abdulhadi Email: aliabdulmawjood@uomosul.edu.iq

8. Course Objectives

Course Objectives	The computer programing (MATLAB) 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 computer programming by MATLAB language to be able program and solve question by programming it in MATLAB language..

9. Teaching and Learning Strategies

Strategy	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.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1-2	4		details – introduction to matlab programming input output statements-input statements – practical examples and questions	Theoretical lectures in class	Exam
3-4	4		input output statements-disp statements – practical examples and questions	Theoretical lectures in class	HW & Exam
5-6	4		control statements practical examples and questions control statements – if statements-practical examples and questions control statements – if-else statements-practical examples and questions	Theoretical lectures in class	HW & Exam
7-8	4		Mid-term Exam	Theoretical lectures in class	Exam
9-10	4		control statements – if-elseif-else-end statements-practical examples and questions control statements – for-end statements-practical examples and question	Theoretical lectures in class	HW & Exam
12-11	4		library function-practical examples and questions	Theoretical lectures in class	HW & Exam
13-14	4		logical statements – practical examples and questions logical statements – and-or-not statements-	Theoretical lectures in class	HW & Exam

			practical examples and questions		
15	4		**Preparatory week before the final Exam**	Theoretical lectures in class	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)	Advanced Mathematics and Mechanics Applications Using Matlab 2005
Recommended books and references (scientific journals, reports…)	Advanced Mathematics and Mechanics Applications Using Matlab 2005
Electronic References, Websites	https://www.coursera.org/browse/physical-science-and-engineering/Matlab-programming

Course Description Form

1. Course Name:
Soil Physics
2. Course Code:
DWRE 245
3. Semester / Year:
First/ 2023−2024
4. Description Preparation Date:
1/9/2023
5. Available Attendance Forms:
Personal attendance of students
6. Number of Credit Hours (Total) / Number of Units (Total)
30 hours/ 2 ECTS credits
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Abdulazeez Abdulbasit Mohammed Email: abdulazeez.mohamed@uomosul.edu.iq Name: Mohamad Tarek Mahmood, Email: m.altaiee@uomosul.edu.iq
8. Course Objectives

Course Objectives	• Enabling the student to become familiar with the physical properties of soil. • Defining the requests with the mathematical relationships of the block. • Introducing students to the properties of green onions in soil. • Enable students to know and measure water flow in the soil. • Training students to know and measure the permeability and hydraulic conductivity of soil. • Giving the student sufficient information regarding the general equations of flow • Providing the necessary information to the student according to his specialization in water resources.

9. Teaching and Learning Strategies

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

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Introducing the student to the ABCs of soil physics	Introduction to soil physic		
2	2	Introducing the student to the basic properties of soil physics	Soil physical properties	A lecture	
3	2	Introducing the student to the mathematical relationships of volume and mass	Volume and mass relationships	A lecture	
4	2	Introducing the student to the most important methods of measuring water flow in the soil.	Water flow throw soil	A lecture	HW
5	2	Introducing the student to methods for measuring soil moisture content	Soil water content	A lecture	Quizze
6	2	Introducing the student to how to calculate potentials in the soil	Soil water potential	A lecture	Term exam
7	2	Introducing the student to how to calculate the soil moisture curve	Characteristic soil characteristic curve	A lecture	
8	2	Introducing the student to how to measure water flow to saturated soil	Water flow in saturated so	A lecture	HW
9	2	Introducing the student to Darcy's law	Darcy's law	A lecture	Quizze
10	2	Introducing the student to calculating the hydraulic conductivity and permeability of soil	Hydraulic conductivity an permeability	A lecture	
11	2	Introducing students to calculating water flow in unsaturated soil	Water flow in unsaturated soil	A lecture	HW

12	2	Introducing students to methods of using general equations of flow	General equations of flow	A lecture	Quizze
13	2	Introducing the student to surface tension and its practical applications	Surface tension	A lecture	Term exam
14	2	Introducing the student to shear stress and methods of measuring it	Shear stress	A lecture	
15	2	Introducing the student to soil sorptivity and methods for measuring it	Soil sorptivity	A lecture	

11. Course Evaluation

Evaluation type	**Degree**
2 quizzes	10
4 homework	10
Term exam	30
Final exam	50
Total	100

12. Learning and Teaching Resources

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

Course Description Form

1. Course Name:
Fluid Mechanics 1
2. Course Code:
DWR 241
3. Semester / Year:
First 2023-2024
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	The fluid mechanics is the basic subject for second-stage students in the dams and w resources engineering department that from this subject student will learn and practice to f properties (units and dimensions, Density, Specific weight. Viscosity, Surface tens Capillarity. Fluid static (pressure–density–height relationships). Absolute pressure and g pressure, types of pressure gages. Force on submerged plane surfaces. Force on submer curved surfaces. Applied problem about gates, dams ……etc. Stability of submerged floating bodies. This achieved by theoretical lecturers.

9. Teaching and Learning Strategies

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

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Introduction	Introduction	Presentation And white board	Monthly exam
2	2	Fluid properties – Units and D Density, Specific weight,	Fluid properties – U and Dimensions, Den Specific weight,	Presentation And white board	Monthly exam
3	2	Compressibility, Elasticity. Surface tension, Capillarity	Compressibility, Elasticity. Visco Surface tension, Capilla	Presentation And white board	Monthly exam
4&5	4	Fluid static (pressure–dens relationships).	Fluid static (pressu density–height relationships).	Presentation And white board	Monthly exam
6	2	Fluid static (pressure–dens relationships).	Fluid static (pressur height relationships	Presentation And white board	Monthly Exam
7	2	First monthly exam			
8&9	4	Absolute pressure and gage types of pressure gages	Absolute pressure a pressure,. types o gages	Presentation And white board	Monthly Exam
10	2	Force on submerged plane surfa	Force on submerg surfaces.	white board	Monthly Exam
11	2	Stability of submerged and float	Stability of subme floating bodies.	white board	Monthly Exam
12	2	Applied problem about gat ……etc.	Applied problem ab dams ……etc.	white board	Monthly Exam
13	2	Applied problems on St submerged and floating bodi	Applied proble Stability of subm floating bodies	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

1. Course Name:
Strength of Material I
2. Course Code:
DWR 244
3. Semester / Year:
1/2023−2024
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. Saddam M. AHMED Email: ahmed.saddam@uomosul.edu.iq
8. Course Objectives

Course Objectives	In DWR 244, initially students will learn how to analysis and assess the Internal strength and deformation for systems. Upon successful completion of this course the student shall be able to assess the: 1. Assess Mechanical properties of systems, (i) 2. Behavior of Axially Loaded Bars and trusses, (i) 3. Design Axially Loaded Bars and trusses, (ii)

	4. Assess the shear stresses and design the connections and bolts, (ii) 5. Assess the deformation and strain for cables and analysis indeterminate system, (i) 6. Assess the shear stresses, deformation and design of system due to torsion, (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	Introduction, syllabus, Conditions for Rigid-Body Equilibrium, Structural Analysis	General introduction	Theoretical lectures in class	Exam1
2, 3 and 4	6	Structural Analysis, Average Normal Stress in an Axially Loaded Bar, Simple Truss stresses.	Stress, Allowable Stresses	Theoretical lectures in class	Exam1
5, 6 and 7	6	Shear Stress, Allowable Stress, Design of Simple Connections,	Shear Stress, Allowable shear Stresses	Theoretical lectures in class	Exam2
8,9 and 10	4	Assess the deformation and strain for cables and analysis indeterminate system.	Deformation and indeterminate structure analysis	Theoretical lectures in class	Exam2
11 and 12	4	Torsional Deformation of a Circular Shaft, The Torsion Formula, Power Transmission, Angle of Twist	Torsion	Theoretical lectures in class	Exam3
13 and 14	4	Shear stresses, deformation and design of system due to torsion	Torsion	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)	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).
Main references (sources)	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).

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

Course Description Form

1. Course Name:	
Building construction	
2. Course Code:	
DWR 243	
3. Semester / Year:	
1/2023-2024	
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:Noor Adrees Khattab Email: n.kattab@uomosul.edu.iq	
8. Course Objectives	
Course Objectives	**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..**
9. Teaching and Learning Strategies	
Strategy	- In DWR 243, 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: 1- The stages of construction of buildings. 2- Types of foundations. 3- Nature of soil and their relationship to foundations. 4- Types of stresses on hardened concrete.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	General introduction of buildings, stages of construction of buildings, steps of implementation, types of buildings (i)	Introduction; General introduction of buildings, stages of construction of buildings, steps of implementation, types of buildings	Theoretical lectures in class	Exam
2	4	Mechanical equipment used in earthworks, methods of groundwater discharge, Determinants of depth of foundations, Nature of soil and their relationship to foundations, Soil classification. (i)	Mechanical equipment used in earthworks, methods of groundwater discharge, Determinants of depth of foundations, Nature of soil and their relationship to foundations, Soil classification.	Theoretical lectures in class	HW & Exam
3	4	Sieve analysis of concrete aggregate / sieve analysis of gravel.. (i)	Introduction Sieve analysis of concrete aggregate / sieve analysis of gravel.		
4	2	Types of foundations, vibrations and foundations, cases requiring the use of Piles foundations.. (ii)	Types of foundations, vibrations and foundations, cases requiring the use of Piles foundations.	Theoretical lectures in class	HW & Exam
5	4	Studying the. Sieve analysis of sand. (ii)	Sieve analysis of sand.		
6	2	Identifying the Piles foundations, Classification of piles, Piles groups, methods of calculating weights of concrete mixes materials (i)	Piles foundations, Classification of piles, Piles groups, methods of calculating weights of concrete mixes materials	Theoretical lectures in class	HW & Exam
7	2	Learn the Specific gravity, Unit weight, moisture content of gravel.. (ii)	Specific gravity, Unit weight, moisture content of gravel.		
8	6	Designing. Concrete components, Cement types, Cement components, Gravel	Concrete components, Cement types, Cement components, Gravel	Theoretical lectures in class	HW & Exam

		grading, Standard specifications of aggregates.. (ii) Specific gravity, Unit weight, moisture content of sand.	grading, Standard specifications of Specific gravity, Unit weight, moisture content of sand.aggregates.		
9	2	Identifying Additives, Concrete properties before and after the hardening. Find standard Softness and primary and final bonding time for cement paste.	Additives, Concrete properties before and after the hardening. Find standard Softness and primary and final bonding time for cement paste.	Theoretical lectures in class	HW & Exam
11-10	2	LearnTypes of stresses on hardened concrete. Find compressive strength of cement mortar for different ages.. (ii) (i)	Types of stresses on hardened concrete. Find compressive strength of cement mortar for different ages.	Theoretical lectures in class	Exam
13-12		Dimensional and volume changes in concrete, work and production of concrete. Find tensile strength of cement mortar for different ages.	Dimensional and volume changes in concrete, work and production of concrete. Find tensile strength of cement mortar for different ages.		
15-14		Concrete Placement, Maturation of concrete, and Concrete Works in Hot weather, Classification of concrete by density. Properties of fresh concrete.	Concrete Placement, Maturation of concrete, and Concrete Works in Hot weather, Classification of concrete by density.		

11. Course Evaluation

Evaluation type	**Degree**
3 Term exam	30
Midterm exam	20
Final exam	50
Total	100

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	• o Construction of buildings, by Zuhair Saku and Artin Levon.
Main references (sources)	• 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.
Recommended books and references (scientific journals, reports…)	----------
Electronic References, Websites	----------

Course Description Form

1. Course Name:	
Surveying I	
2. Course Code:	
DWRE 207	
3. Semester / Year:	
First/ 2023-2024	
4. Description Preparation Date:	
1/6/2023	
5. Available Attendance Forms:	
Lectures on theory conducted in the classroom. A practical lecture conducted in the laboratory.	
6. Number of Credit Hours (Total) / Number of Units (Total)	
5 hours/ 4 credits	
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 Ismael Nasar, Email: alaa @uomosul.edu.iq	
8. Course Objectives	
Course Objectives	Surveying I aims to teach students how to measure distances through obstac construction and adjustment of levels, Measurement a long straight line offset, Method locating a point or the types of coordinates, Systematic or accumulation errors for t Reciprocal leveling, Determine Contour Interval and Contour Line Values, determine level of the sewer, and computation of area (regular and irregular figures) by using diffe methods.
9. Teaching and Learning Strategies	
Strategy	Learning and teaching strategies in surveying will be designed to engage students in the subject matter while equipping them with the necessary knowledge and skills. These will be encouraged

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

10. Course Structure

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

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

11. Course Evaluation

Evaluation type	**Degree**
2 quizzes	10
1 homework	5
classwork	20
Term exam	15

Final exam	50
Total	100
12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Surveying (A.Bannister & S.Raymond)
Main references (sources)	Surveying by (S.K.Hussin and M.SNagaraj)
Recommended books and references (scientific journals, reports…)	-------
Electronic References, Websites	

Course Description Form

1. Course Name:	
Mathematics IV	
2. Course Code:	
DWR247	
3. Semester / Year:	
Second / 2023-2024	
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)	
4/2	
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	○ Understanding of the fundamental concepts of Partial Differentiation (i) ○ Used Tangent plane and normal line to find the equation of a plane (i) (ii). ○ Understanding the maxima and

	minima of functions of several independent variables (i) ○ Apply the principle of double integrals to find the area under the curves (i) (ii). ○ Understanding of the fundamental concepts Infinite Sequences and Series approach (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, 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. The course objects demonstrate sequence in mathematics IV primarily for students intending to major 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	12	Understanding of the fundamental concepts of Partial Differentiation	Partial Differentiation And Second – Order Partial Differentiation	A lecture in class	H.W, C.W and Exam
4-6	12	Understanding of the fundamental concepts of Partial Differentiation	The chain rule for part derivatives, The directional derivative	A lecture in class	H.W, C.W and Exam
7-9	8	Understanding of the fundamental concepts of Partial Differentiation	The gradient of surface, Tangent plane and normal line	A lecture in class	H.W, C.W and Exam

10-12	12	Understanding the maxima and minima of functions of several independent variables	Maxima and Minima of function of two independed variables	A lecture in class	H.W, C.W and Exam
13-15	12	Apply the principle of double integrals to find the area under the curves	Double Integrals and Physical Application of double integrals	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)	"Calculus". Ross L Finney and George B. Thomas. Copyright by Addison Wesley Publishing Company, 1990.
Main references (sources)	"THOMAS CALCULUS" George B. Thomas. Printed in the United States of America., 2014.
Recommended books and references (scientific journals, reports…)	_____
Electronic References, Websites	_____

Course Description Form

1. Course Name:
Computer programming (Mat Lab II)
2. Course Code:
3. Semester / Year:
2/2023-2024
4. Description Preparation Date:
25/2/2024
5. Available Attendance Forms:
Theoretical lectures in class and practical lab
6. Number of Credit Hours (Total) / Number of Units (Total)
4/2
7. Course administrator's name (mention all, if more than one name)
Omar Kanan Taha Email: omar.alsultan@uomosul.edu.iq Ali Ahmed Abdulhadi Email: aliabdulmawjood@uomosul.edu.iq

8. Course Objectives
Course Objectives The computer programing (MATLAB) 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 computer programming by MATLAB language to be able program and solve question by programming it in MATLAB language..
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 type of simple experiments involving some sampling activities that are interesting to the students.
10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1-2	4		matrix – introduction-practical examples and questions	Theoretical lectures in class and practical in lab	Exam
3-4	4		plotting using matlab plotting statements-practical examples and questions	Theoretical lectures in class and practical in lab	HW & Exam

5-6	4		applied engineering numerical methods for solving equation- practical examples and questions	Theoretical lectures in class and practical in lab	HW & Exam
7-8	4		Mid-term Exam	Theoretical lectures in class and practical in lab	Exam
9-10	4		applied engineering numerical methods for solving equation- practical examples and questions	Theoretical lectures in class and practical in lab	HW & Exam
12-11	4		applied engineering numerical methods for solving equation- practical examples and questions	Theoretical lectures in class and practical in lab	HW & Exam
13	4		applied engineering numerical methods for solving equation- trail and error method- mid way method- practical examples and questions	Theoretical lectures in class and practical in lab	HW & Exam
14	4		applied engineering numerical methods for solving equation- Newton Raphson method- practical examples and questions	Theoretical lectures in class and practical in lab	HW & Exam
15	4		**Preparatory week before the final Exam**	Theoretical lectures in class and practical in lab	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 textbo (curricular books, any)	• ----------
Main referen (sources)	Advanced Mathematics and Mechanics Applications Using Matlab 2005
Recommended books and references (scientific journals, reports…)	Advanced Mathematics and Mechanics Applications Using Matlab 2005
Electronic References, Websi	https://www.coursera.org/browse/physical-science-and-engineering/Matlab-programming

Course Description Form

1. Course Name:	
Water management and land reclamation	
2. Course Code:	
DWR 251	
3. Semester / Year:	
Second Semester/ 2023-2024	
4. Description Preparation Date:	
18/4/2024	
5. Available Attendance Forms:	
Theoretical lectures in the classroom and practical lectures in the field and laboratory	
6. Number of Credit Hours (Total) / Number of Units (Total)	
(4*15) 60hours/ 2 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	**This course provides students with an inclusive idea about irrigation and drainage management and soil conservation besides water balance in the root zone, salt balance, salinity and classification of saline soil, salt equilibrium equation, maintenance leaching requirement, fundamental leaching, reclamation of calcareous and gypsiferous soils.**
9. Teaching and Learning Strategies	
Strategy	**This course is the second part of soil physics dealing with Infiltration, internal drainage and redistribution after infiltration, evaporation from bare soil, evaporation with presence of water table and salinity danger,**

	water balance in the root zone , salt balance, salinity and classification of saline soil, salt equilibrium equation, maintenance leaching requirement, fundamental leaching, reclamation of calcareous and gypsiferous soils.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	An introductory lecture on the theoretical part and laboratory work	A brief overview of the vocabulary of the practical and theoretical scientific method	**Theoretical lectures in the classroom and practical lectures in the field and laboratory**	
2-4	12	Introducing the student to the importance of studying the process of water infiltration into the soil	Infiltration equations, factors affecting the depth of cumulative seepage and rate of seepage, and laboratory and field experiments necessary for this	**Theoretical lectures in the classroom and practical lectures in the field and laboratory**	Monthly exam in the fourth week and receiving field and laboratory work reports on a weekly basis & Homework
5-8	16	Introducing the student to the importance of studying internal drainage and moisture redistribution	Internal drainage Redistribution after infiltration and field experiments necessary for this	**Theoretical lectures in the classroom and practical lectures in the field and laboratory**	Mid-semester exam in the eighth week
9-10	8	Introducing the student to the importance of studying evaporation from the surface of soil devoid of vegetation and determining the effect of groundwater on the depth of evaporation	Evaporation from bare soil & Water table and evaporation	**Theoretical lectures in the classroom and practical lectures in the field and laboratory**	Monthly exams in the tenth week & Mid-course exam in the eighth week & Receiving field and laboratory work reports on a weekly basis & Homework
11-15	20	Introducing the student to the importance of studying the water budget, salt budget, and energy budget in the field, how to manage irrigation water in the field, and land reclamation.	Water balance/Energy balance/ Salt balance/Leaching and leaching requirement/Calcareous and gypsiferous soils.	**Theoretical lectures in the classroom and practical lectures in the field and laboratory**	Monthly exam in the thirteenth week, and receiving field and laboratory work reports on a weekly basis

11. Course Evaluation

Evaluation type	Degree
3 Monthly exams	15
2 homework	5
10 Scientific report	20
Midterm exam	10

Final exam	50
Total	100

12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Applied soil physics R.J.Hanks & G.L.Ashcroft
Main references (sources)	Soil physics
Recommended books and references (scientific journals, reports…)	Introduction to soil physics Hillel
Electronic References, Websites	**https://www.coursera.org/search?query=engineering%20drawing**

Course Description Form

1. Course Name:
Fluid Mechanics II
2. Course Code:
DWR 248
3. Semester / Year:
Second 2023−2024
4. Description Preparation Date:
9/4/2024
5. Available Attendance Forms:
Lectures and Tutorials
6. Number of Credit Hours (Total) / Number of Units (Total)
6 hr/3 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 Name:Arwa Abd AL-razaq Jamal Email: arwa.abdalrazzaq@uomosul.edu.iq
8. Course Objectives

Course Objectives	• **Inform students about the kinematics of flow motion** • **learn continuity equation and conversation of mass principle** • **learn Bernoulli equation for incompressible fluid and conversation**

	of energy principle • **learn the working principles of pumps and turbines and their applications** • **learn the working principles of Venturi meter and applications** • **learn the working principles of orifice meter and applications** • **learn the working principles of pitot tube and applications** • **learn impulse–momentum equation and applications**

9. Teaching and Learning Strategies

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

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	Learn the Kinematics of fluid motion	Kinematics of fluid motion	presentation	Monthly exam
2	4	learn continuity equation and conversation of mass principle	continuity equation and conversation of mass principle with applications	Presentation And white board	Monthly exam
4&3	6	learn Bernoulli equation for incompressible fluid and conversation of energy principle	Bernoulli equation for incompressible fluid and conversation of energy principle	Presentation And white board	Monthly exam
4	2	Fist monthly exam			
5&6	8	Learn working principles of pumps and turbines and their applications	Pumps and turbines in Bernoulli equation	Presentation And white board	Monthly Exam
7&8	6	Learn working principles of Venturi meter and applications	Venturi meter	Presentation And white board	Monthly Exam
8	2	Second monthly exam			
9&10	8	Learn working principles of orifice meter and applications	orifice meter	Presentation And white board	Monthly Exam

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

Laboratory Experiments:

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Learn how to write the Report	Writing report	presentation	Experimental reports
2	2	Learn Center of Pressure of Immersed Surface	Center of Pressure of Immersed Surface	Laboratory experiments	Experimental reports
3	2	Bernoulli's equation	Proof Bernoulli's equation	Laboratory experiments	Experimental reports
4	2	calculate Reynolds Number in Pipe	Reynolds Number in Pipe	Laboratory experiments	Experimental reports
5&6	4	Calculate Forces due to Jet Impact on Plates	Forces due to Jet Impact on Plates	Laboratory experiments	Experimental reports
7	2	First laboratory exam			
8&9	4	Learn Discharge Measurements in Pipes by Orifice Meter	Discharge Measurements in Pipes by Orifice Meter	Laboratory experiments	Experimental reports
10	2	Calculate Friction Factor in Pipes	Friction Factor in Pipes	Laboratory experiments	Experimental reports
11&12	4	Learn impulse-momentum equation and applications	impulse-momentum equation	Laboratory experiments	Experimental reports
13&14	4	Learn Discharge Measurement in Open Channel by Weirs	Discharge Measurement Channel by Weirs	Laboratory experiments	Experimental reports
15	2	second laboratory exam			

11. Course Evaluation

Evaluation type	degree
First monthly exam	10
Second monthly exam	10

Third monthly exam	10
Reports and laboratory exams	20
Final exam	50
total	100

12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Elementary fluid mechanics By: Vinnard 6th ed. 1981
Main references (sources)	Fluid mechanic and Hydraulic machines By: Bansal 9th ed. 2010
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

Course Description Form

1. Course Name:	
Strength of Material II	
2. Course Code:	
DWR 253	
3. Semester / Year:	
2/2023-2024	
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. Saddam M. AHMED Email: ahmed.saddam@uomosul.edu.iq	
8. Course Objectives	
Course Objectives	In DWR 244, initially students will learn how to analysis and assess the Internal strength and deformation for systems. Upon successful completion of this course the student shall be able: 1. Assess Mechanical properties of beams and can evaluate the max shear and bending moment in the system, (i) 2. Assess the behavior of element under bending action, (i) 3. Evaluate the stress distortion due to combination action of force and bending, (ii)

	4. Assess the maximum deformation and slope with the system, (ii) 5. Assess the deformation and strain for cables and analysis indeterminate system, (i) 6. Evaluate Principal Stresses and Maximum In-Plane Shear Stress using Mohr's Circle–Plane Stress, Absolute Maximum Shear Stress, Plane Strain, (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, 3 And 4	8	1 Shear and Moment Diagrams 2 Graphical Method for Constructing Shear and Moment Diagrams 3 Bending Deformation of a Straight Member 4 The Flexure Formula 5 Unsymmetric Bending 6 Stress Concentrations	Bending	Theoretical lectures in class	Exam1
5 and 6	4	1 Shear in Straight Members 2 The Shear Formula 3 Shear Flow in Built-Up Members	Transverse Shear	Theoretical lectures in class	Exam2
7 and 8	4	State of Stress Caused by Combined Loadings	Combined Loadings	Theoretical lectures in class	Exam2
9, 10 and 11	6	1 The Elastic Curve 2 Slope and Displacement by Integration 3 Moment area method	Deflection of Beams and Shafts	Theoretical lectures in class	Exam3
12, 13 and 14	6	1Plane-Stress Transformation 2 General Equations of Plane-Stress Transformation 3 Principal Stresses and Maximum In-Plane Shear Stress 4 Mohr's Circle–Plane Stress 5 Absolute Maximum Shear Stress 6 Mohr's Circle–Plane Strain 7Material-Property Relationships	Stress and Strain Transformation	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)	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).
Main references (sources)	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).
Recommended books and references (scientific journals, reports…)	----------
Electronic References, Websites	----------

Course Description Form

1. Course Name:	
Construction Materials Technology	
2. Course Code:	
DWR 250	
3. Semester / Year:	
2/2023-2024	
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:Noor Adrees Khattab Email: n.kattab@uomosul.edu.iq	
8. Course Objectives	
Course Objectives	**Brick and block works, Properties of fresh concrete, Stone works, Brick tests, Formwork and scaffolding, Test compressive strength of concrete, lintels, beams and columns, Block test, Floors and ceilings, Tiles tests, Steel reinforcement bars tests, Moisture blocker works.**
9. Teaching and Learning Strategies	
Strategy	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering some challenging problems to motivate students.

	- Brick and block works. (i) - Stone works. (i) - Formworks and scaffolding. (i) - Lintels, beams and columns. (ii) - Floors and ceilings. (ii) - Moisture blocker works. (ii)

10. Course Structure

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

11. Course Evaluation

Evaluation type	Degree

3 Term exam	30
Midterm exam	20
Final exam	50
Total	100
12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	• o Construction of buildings, by Zuhair Saku and Artin Levon.
Main references (sources)	• 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.
Recommended books and references (scientific journals, reports…)	----------
Electronic References, Websites	----------

Course Description Form

1. Course Name:
Surveying II
2. Course Code:
DWRE214
3. Semester / Year:
Second / 2023-2024
4. Description Preparation Date:
1/6/2023
5. Available Attendance Forms:
Lectures on theory conducted in the classroom. A practical lecture conducted in the laboratory.
6. Number of Credit Hours (Total) / Number of Units (Total)
5 hours/ 4 credits
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 Ismael Nasar, Email: alaa @uomosul.edu.iq

8. Course Objectives

Course Objectives	Surveying II aims to teach students how to calculate the earthworks and reservoir volu from contour maps, bearing of lines, designation of bearing, theodolite, construction adjustment of the theodolite, measurement of angles, traverse surveys and their adjustm tachometer, and total station.

9. Teaching and Learning Strategies

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

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	5	To calculate areas using different methods(i)	Introduction, Irregular figures, Give and take lines, Counting squares.	Lectures on theory conducted in the classroom. A practical lecture conducted in the laboratory.	
2	5	To calculate areas using different methods(i). and choosing the appropriate method(iii).	Counting squares, Trapezoidal Rule, Simpson Rule (for odd number),Quiz No.1	Lectures on theory conducted in the classroom. A practical lecture conducted in the laboratory.	Quiz No.1
3	5	To calculate volumes using different methods(i) and choose the appropriate method for calculating earthwork volumes (iii)	Volumes Earthwork calculation, Volumes from cross-sections, Sections level a cross (one level section), Sections with a cross fall (two level section).	Lectures on theory conducted in the classroom. A practical lecture conducted in the laboratory.	
4	5	To calculate volumes using different methods(i) and choose the appropriate method for calculating earthwork volumes (iii)	Sections part in cut and pa fill, Section of variable lev three level section), Multi-l section	Lectures on theory conducted in the classroom. A practical lecture conducted in the laboratory.	HW
5	5	To calculate volumes using different methods(i) and choose the appropriate method for calculating earthwork volumes (iii)	Computation of volumes, n areas, end areas, Prismo formula.	Lectures on theory conducted in the classroom. A practical lecture	

				conducted in the laboratory.	
6	5	To calculate volumes using the volume of a pyramid, and the Volume of wedge.	The volume of a pyran The Volume of wedge.	Lectures on theory conducted in the classroom. A practical lecture conducted in the laboratory.	
7	5	To calculate volumes using Simpson's , spot levels (i) and choose the appropriate method for calculating earthwork volumes (iii)	Simpson's Rule Volumes, Volumes from levels or (volume of Borr Volume from contour lines	Lectures on theory conducted in the classroom. A practical lecture conducted in the laboratory.	
8	5	To use plane surveying instruments such as: Theodolite.	Mid-term Exam, Beari Designation of Bearing		Mid-term Exam
9	5	Learn how to calculate back bearing from angles(i) .	Deflection angle, Fore Back Bearings. Calculatio bearings from angles,	Theoretical lectures in class and A lecture in the lab.	
10	5	Learn how to calculate deflection angles from included angles(i)	Calculation of deflection an from included angles, C No.2	Lectures on theory conducted in the classroom. A practical lecture conducted in the laboratory.	Quiz No.2
11	5	To use plane surveying instruments such as: Theodolite.(i).	The theodolite and trav surveying, Trav computations, Latitudes departure.	Lectures on theory conducted in the classroom.	
12	5	Correcting angles and lengths of sides using various methods (iii).	Closing error, Graph adjustment, bowditch's r Transit rule, Distribution of angular error	A practical lecture conducted in the laboratory.	
13	5	To use plane surveying instruments such as: Tachometry (iii)	Tachometry, Optical princip Determine the stadia inte factor	Lectures on theory conducted in the classroom. A practical lecture conducted in the laboratory.	H.W
14	5	To determine the distance using Tachometry and to use plane surveying instruments such as: Total station (iii)	Tachometry, Optical princi , Total station	Lectures on theory conducted in the classroom. A practical lecture conducted in the laboratory.	
15	5	to use plane surveying instruments such as: Total station (iii)	Total station	Lectures on theory conducted in the classroom. A practical lecture	

				conducted in the laboratory.	
16	3		**Preparatory week before final Exam**		**final Exam**

11. Course Evaluation

Evaluation type	**Degree**
2 quizzes	7.5
2 homework	7.5
classwork	20
Term exam	15
Final exam	50
Total	100

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Surveying (A.Bannister & S.Raymond)
Main references (sources)	Surveying by (S.K.Hussin and M.SNagaraj) المساحة الهندسية - تأليف الدكتور ناجي توفيق
Recommended books and references (scientific journals, reports…)	-------
Electronic References, Websites	

Third Level

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

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

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:

2/2023-2024

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/ 2023-2024
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:
2/2023-2024
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,	Theoretical lecture in class	HW

			Typical Failure Factors for Hydraulic Installations, Source of Data.		
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 information, Test for Consistency of Records,	Theoretical lectures in class	H W & Exam
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,	Theoretical lectures in class	Quizzes & HW

			Types of evaporation meters, reducing evaporation from tanks.		
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 hydrograph, Direct Runoff or Surface Flow (D.R.O.), Base Flow (B.F.) , Base Flow Separation, Effective Rain, Unit Hydrograph, Unit Hydrograph Assumptions, Unit Hydrograph Derivation, Unit Hydrograph for Different Duration	Theoretical lectures in class	HW1 HW2
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/2023−2024
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 - flood water - ground water	Introducing the student to irrigation in general	Lecture	
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 -	rrigation water sources and storage	Lecture	H.W(2)and Dailyexam(2)

		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			
6	2	Monthly exam(1)			
7-8	4	Soil and soil basic relationships - soil texture - soil structure (soil construction) - specific gravity (real weight) - specific weight Pore space - leaching - soil water input - permeability - soil depth - plant food compounds - soluble excess salts	The basic relationships between soil and water	Lecture	H.W(3)and Daily exam(3)
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 - Input rate measurement (soil absorption of water) - Precipitation and movement of soil water during irrigation - Asymmetric and non-homogeneous soil in all directions .	The flow of water into and through the soil	lecture	H.W(6) and Daily exam(4)
15	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 boo 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 / 2023-2024	
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:	
2/2023−2024	
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 Sections, Tension-Controlled Sections, and Compression-Controlled	Principles of ultimate load carrying capacity	Theoretical lectures in class	Exam2
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)	○ Al-Asho, M. O "Soil Mechanics Principles", 1990 Student textbook, University of Mosul.
Main references (sources)	○ - Das, B.M. and Sobhan, K. "Principle of Geotechnical Engineering", Ninth Edition, Cengage Learning. ○ 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 / 2023-2024
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 / 2023-2024
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	Graphical Representation Hydrologic Data; Dot	A lecture in class	H.W, C.W and Exam

		and graphical of hydrological data	Diagram; Histogram; Frequency Polygon		
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:
2/2023–2024
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	scientific texts 5	Theoretical lectures in class	Quizzes and exams

		terms of vocabularies, structure and translation.			
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:
2/2023−2024
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 2023−2024

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 presentatic 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	Open channel, types and classifications.	Open channel, typ and classifications	Presentation And white board	Monthly exam
2	2	Uniform flow, Chezy and l equations.	Uniform flow, Ch and Mann equations.	Presentation And white board	Monthly exam
3	2	Best hydraulic cross secti	Best hydraulic cr section	Presentation And white board	Monthly exam

4&5	4	Consecration of hydrauli and Manning coefficie	Consecration hydraulic radius a Manning coefficie	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 wit 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:

2/2023−2024

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:
2/2023-2024
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 I. M. A. Al-kiki	Email: karabash@uomosul.edu.iq 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, methods of slope stability analysis.**	**Lecture in class**	**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)	○ Al-Asho, M. O "Soil Mechanics Principles", 1990 Student textbook, University of Mosul.
Main references (sources)	○ - Das, B.M. and Sobhan, K. "Principle of Geotechnical Engineering", ninth Edition, Cengage Learning. ○ 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/2023-2024
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	Introducing the student to the importance of calculating plant water consumption	Lecture	

		plants, Calculation of water consumption reference ETo for crops using the Benman Monteth equation			
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 water consumption of a crop during an entire season	Lecture	Daily exam(1)
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	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

		irrigation system design, sprinkler network design			
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 (curricu 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 / 2023−2024

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 by moment distribution method	Analysis the statically indeterminate structures by moment distribution 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:

Reinforced Concrete Design

2. Course Code:

DWR 393

3. Semester / Year:

2/2023−2024

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:
2/2023-2024
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	Theoretical lectures in class	

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

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

Course Description Form

1. Course Name:

English Language – Upper Intermediate

2. Course Code:

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3. Semester / Year:

First/ 2023–2024

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:
2/2023-2024
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.**	Defines and important of engineering management	Theoretical lectures in class	Exam

		Safety and Risk. 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/ 2023−2024

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/ 2023-2024
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_SvLC7LCRLmVtTAp yLA/videos

Course Description Form

1. Course Name:
Design of irrigation and drainage networks
2. Course Code:
DWR 442
3. Semester / Year:
First 2023−2024
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,I ,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 / 2023-2024	
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 (Advanta 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 lectur in class	HW and Exame
1	2	Elementary profile of th gravity dam (Design considerations) (Stresse development in an elementary profile)	Gravity dams	Theoretical lectur in class	HW and Exame
2	4	Arch dams	Arch dams	Theoretical lectur 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: I Senturk, Water Resources Publications, Colora U.S.A.,1994. 2. Theory and Design of Irrigation Structures, Vol. II, R. S. Varshney, S. C. Gupta and R. L. Gupta, N Chand & Bros, Roorkee (U.P.), India,1982. 3. Earth-Rock Dams, Engineering Problems of De and Construction, By: J. L. Sherard, R. J. Woodw S. F. Gizienske and W. A. Clevenger, John Wiley Sons, Inc., New York, 1963. 4. Engineering for Dams, By: W. P. Greager, J. D. Ju and J. Hinds, In three Volumes, John Wiley and S 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 Syst Planning and Management: An Introduction to Meth 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:
1/2023-2024
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:
2/2023-2024

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/ 2023-2024
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 a 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/ 2023-2024
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 meth 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_SvLC7LCRLmVtTAp yLA/videos

Course Description Form

1. Course Name:
Estimation and Specification
2. Course Code:
DWR448
3. Semester / Year:
2/2023−2024
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 / 2023-2024
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/ 2023-2024
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:

2/2023−2024

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	----------