

**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

Northern Technical University – Polytechnic College / Mosul
**Department of Environmental and Water Resources Engineering
Technologies**

2025 – 2026



Academic Program Description Form

University Name: Northern Technical University

Faculty / Institute: Polytechnic College / Mosul

Scientific Department: Department of Environmental and Water Resources Engineering Technologies

Academic or Professional Program Name: Technical Diploma / Technical Bachelor

Final Certificate Name: Diploma / Bachelor in Environmental and Water Resources Engineering Technologies

Academic System: Bologna Process – European Credit Transfer System (ECTS)

Description Preparation Date: 2/9/2025

File Completion Date: 2/9/2025

Signature:

Head of Department Name: Dr. Maha
Mohammad Taha

Date: 2/9/2025

Signature:

Scientific Associate Name: Dean's Assistant
for Scientific Affairs

Date: 2/9/2025

The file is checked by:

**Department of Quality Assurance and University
Performance**

**Director of the Quality Assurance and University
Performance Department:**

Date: 2/9/2025

Signature:

**Dr. Abdulnaser Abdulrazzaq
Ahmed**

**Approval of the Dean
3/9/2025**

1. Program Vision

The vision of department of Environmental engineering and water resources technologies (EWRT) 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. EWRT aims to achieve an advanced level of education in the field of water resources 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.

The vision of the department is to be a leader and pioneer in the field of modern water resources and environmental technologies at the level of education and scientific research and the use and management of these technologies, by providing the graduate with the expertise that qualifies him to participate effectively in water resources management in terms of planning, design, implementation, operation and maintenance of irrigation projects such as irrigation and drainage networks and hydraulic facilities such as dams.

And spreading the environmental culture necessary to create a sound environmental reality. A comprehensive study of environmental sciences and their applications and uses in society from a theoretical and practical perspective. Focus and interest in studying microorganisms polluting water resources.

2. Program Mission

The mission of EWRT is:

1. Qualify competent engineers to work in the field of water resources.
2. The mission of the department is to provide the work fields with distinguished technicians in the field of water resources engineering to serve development plans and contribute effectively to the implementation of engineering projects, provide scientific advice, prepare economic feasibility studies, design irrigation projects, treat polluted water, and publish solid research that supports the wheel of science and education, in addition to providing technical services and contributing to solving current problems, especially those related to the shortage of water resources and the increase in salinity and pollutants.
3. Striving to achieve a distinguished level in the theoretical and practical educational fields, as environmental specialization is one of the important specializations in the civilized countries of the world and has become one of the urgent specializations and the necessities of the times. The department seeks to provide an appropriate scientific and applied atmosphere in accordance with the requirements of global environmental protection.
4. 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.
5. Provide the country and society with specialists who hold higher degrees in the hydraulic, hydrological and irrigation specialties to benefit from their scientific expertise.
6. Develop students' performance and strategies to deal with real world problems through constructive and advanced scientific thinking.
7. Adopt the distinguished and creative ideas of students and encouraging them to work as a team.
8. Maintain communication with department's alumni through inviting them to seminars, scientific conferences, and continuing education programs.

3. Program Objectives

The Program Educational Objectives of the Department of Environmental and Water Resources Engineering Techniques may be listed as:

1. Graduating specialized technical cadres in the field of water resources (irrigation and drainage projects, water operation projects, and wastewater treatment).
2. Developing methods to improve the properties of water resources to meet future water needs in addition to improving water quality and purifying it from pollutants.
3. Graduating qualified technical cadres to carry out surveying work including surveying agricultural lands and calculating the quantities of earthworks for irrigation and drainage projects.
4. Developing creative skills in designing and analyzing hydraulic structures and identifying expected engineering problems and finding optimal solutions before implementation using modern engineering software.
5. Providing graduates with practical skills in monitoring and organizing irrigation work, determining water needs for irrigation, carrying out work, maintaining and operating irrigation and drainage projects, and installing, operating and maintaining modern irrigation systems.
6. Training graduates to conduct laboratory tests of construction materials and soil investigations and qualifying them to work in construction laboratories.
7. Preparing cadres in the field of environmental technologies with a solid theoretical and practical background that qualifies them to practice their effective specialties.
8. Producing scientific and applied research within the department's specialization for the purpose of solving pollution problems.

4. Program Accreditation

The program does not currently hold program accreditation; the department is completing the requirements for applying for national program accreditation in accordance with the standards of the Directorate of Quality Assurance and Academic Accreditation, Ministry of Higher Education and Scientific Research.

5. Other External Influences

1. Application of the Bologna Process and the European Credit Transfer System (ECTS) adopted by Northern Technical University.
2. Scientific and technological developments in environmental and water resources engineering, and scientific visits to projects and plants.
3. Summer training of students in the relevant state departments (water resources, water and sewerage, environment, agriculture).
4. Linking the program to labour-market and community needs, especially the challenges of water scarcity, pollution and climate change.
5. Financial, logistical and training support from the university, the ministry and the relevant governmental institutions.
6. Facilitating employment and practical training through partnerships with the public and private sectors.
7. Continuous guidance of the program according to ministry instructions and quality assurance and accreditation standards.

6. Program Structure

Program Structure	Number of Courses	Credit Hours (ECTS)	Percentage	Reviews *
Institution Requirements	6	13	5.4%	6 basic (university requirement – C)
College Requirements	3	19	7.9%	3 basic (B)
Department Requirements	41	208	86.7%	41 basic (B)
Summer Training	Fulfilled	-----	-----	Graduation requirement per university regulations
Other	-----	-----	-----	-----
Total	50	240	100%	

* This can include notes whether the course is basic or optional. (B: basic course, C: university requirement)

Curriculum / Modules (1 ECTS = 25 hrs student workload, 30 ECTS per semester)

Code	Module	SSWL	USSWL	ECTS	Type
Semester 1 (First Year) 30 ECTS					
EWRT 100	Soil Physics	63	87	6	B
EWRT 101	Environmental Chemistry	63	37	4	B
EWRT 102	Engineering Mechanics (Statics)	78	72	6	B
MPE 100	Mathematics I	78	72	6	B
EWRT 103	Microbiology	63	37	4	B
NTU 100	Human Rights and Democracy	33	17	2	C
NTU 101	English Language	33	17	2	C
Semester 2 (First Year) 30 ECTS					
EWRT 104	Dynamics	48	77	5	B
MPE 101	Engineering Drawing	93	82	7	B
EWRT 105	Environmental Geology	33	42	3	B
MPE 102	Mathematics II	78	72	6	B
EWRT 106	Introduction to Water Resources Engineering	48	52	4	B
NTU 102	Computer	48	27	3	C
NTU 103	Arabic Language	33	17	2	C
Semester 3 (Second Year) 30 ECTS					
EWRT 107	Fluid Mechanics	93	57	6	B
EWRT 108	Engineering Surveying	93	32	5	B
EWRT 109	Water Supply Networks	45	80	5	B

EWRT 110	Building Construction	45	55	4	B
EWRT 111	Solid Waste Engineering	60	65	5	B
EWRT 112	Diploma Project	45	30	3	B
NTU 200	Crimes of Baath Party	33	17	2	C
Semester 4 (Second Year) 30 ECTS					
EWRT 113	Engineering Hydrology	78	72	6	B
EWRT 114	Strength of Materials	48	52	4	B
EWRT 115	Soil Mechanics	90	60	6	B
EWRT 116	Water Quality Engineering	78	72	6	B
EWRT 117	Drainage Engineering	78	72	6	B
NTU 201	Professional Ethics	33	17	2	C
Semester 5 (Third Year) 30 ECTS					
EWRT 118	Sewer Networks	48	102	6	B
EWRT 119	Air Pollution Control	63	87	6	B
EWRT 120	Advanced Surface Hydrology	78	72	6	B
EWRT 121	Hydraulics Applications	63	87	6	B
EWRT 122	Survey Applications	78	72	6	B
Semester 6 (Third Year) 30 ECTS					
EWRT 123	Environmental Thermodynamics	48	52	4	B
EWRT 124	Numerical Analysis	45	80	5	B
EWRT 125	Reinforced Concrete	78	47	5	B
EWRT 126	Wastewater Treatment Plant Design	78	72	6	B
EWRT 127	Groundwater Hydrology	78	22	4	B
EWRT 128	Foundation Engineering	78	72	6	B
Semester 7 (Fourth Year) 30 ECTS					
EWRT 129	Design of Water Treatment Plants	63	87	6	B
EWRT 130	Design of Hydraulic Structures I	78	72	6	B
EWRT 131	Soil and Ground Water Pollution	63	87	6	B
EWRT 132	Open Channels	78	47	5	B
EWRT 133	Design of Gravity Irrigation Systems	48	52	4	B
EWRT 134	Engineering Project I	33	42	3	B
Semester 8 (Fourth Year) 30 ECTS					
EWRT 135	Engineering Project Management and Economy	63	62	5	B
EWRT 136	Design of Irrigation and Drainage Networks	63	62	5	B

EWRT 137	Design of Sprinkler and Drip Irrigation Systems	93	82	7	B
EWRT 138	Design of Hydraulic Structures II	63	62	5	B
EWRT 139	Estimation and Specifications	63	62	5	B
EWRT 140	Engineering Project 2	33	42	3	B

7. Program Description

Year / Level	Course Code	Course Name	Credit Hours (weekly)	
			Theoretical	Practical
First Year – Semester 1 / 2025-2026	EWRT 100	Soil Physics	2	2
	EWRT 101	Environmental Chemistry	2	2
	EWRT 102	Engineering Mechanics (Statics)	2	1
	MPE 100	Mathematics I	3	2
	EWRT 103	Microbiology	2	2
	NTU 100	Human Rights and Democracy	2	0
	NTU 101	English Language	2	0
First Year – Semester 2 / 2025-2026	EWRT 104	Dynamics	2	1
	MPE 101	Engineering Drawing	0	6
	EWRT 105	Environmental Geology	2	0
	MPE 102	Mathematics II	3	2
	EWRT 106	Introduction to Water Resources Engineering	2	1
	NTU 102	Computer	1	2
	NTU 103	Arabic Language	2	0
Second Year – Semester 3 / 2025-2026	EWRT 107	Fluid Mechanics	2	3
	EWRT 108	Engineering Surveying	3	0
	EWRT 109	Water Supply Networks	3	0
	EWRT 110	Building Construction	3	1
	EWRT 111	Solid Waste Engineering	3	2
	EWRT 112	Diploma Project	1	0
	NTU 200	Crimes of Baath Party	2	3
Second Year – Semester 4 / 2025-2026	EWRT 113	Engineering Hydrology	5	0
	EWRT 114	Strength of Materials	2	1
	EWRT 115	Soil Mechanics	4	2
	EWRT 116	Water Quality Engineering	3	2
	EWRT 117	Drainage Engineering	5	0

	NTU 201	Professional Ethics	2	0
Third Year – Semester 5 / 2025- 2026	EWRT 118	Sewer Networks	3	0
	EWRT 119	Air Pollution Control	4	0
	EWRT 120	Advanced Surface Hydrology	5	0
	EWRT 121	Hydraulics Applications	3	1
	EWRT 122	Survey Applications	2	3
Third Year – Semester 6 / 2025- 2026	EWRT 123	Environmental Thermodynamics	2	1
	EWRT 124	Numerical Analysis	3	0
	EWRT 125	Reinforced Concrete	3	2
	EWRT 126	Wastewater Treatment Plant Design	4	1
	EWRT 127	Groundwater Hydrology	5	0
	EWRT 128	Foundation Engineering	3	2
Fourth Year – Semester 7 / 2025- 2026	EWRT 129	Design of Water Treatment Plants	2	2
	EWRT 130	Design of Hydraulic Structures I	3	2
	EWRT 131	Soil and Ground Water Pollution	4	0
	EWRT 132	Open Channels	3	2
	EWRT 133	Design of Gravity Irrigation Systems	3	0
	EWRT 134	Engineering Project I	2	0
Fourth Year – Semester 8 / 2025- 2026	EWRT 135	Engineering Project Management and Economy	4	0
	EWRT 136	Design of Irrigation and Drainage Networks	4	0
	EWRT 137	Design of Sprinkler and Drip Irrigation Systems	4	2
	EWRT 138	Design of Hydraulic Structures II	3	1
	EWRT 139	Estimation and Specifications	3	1
	EWRT 140	Engineering Project 2	2	0

8. Expected Learning Outcomes of the Program

Knowledge

Learning Outcome A1	Understand the fundamentals of mathematics and engineering sciences (mechanics, fluids, materials, thermodynamics) related to environmental and water resources engineering.
Learning Outcome A2	Know the principles of hydrology, hydraulics, irrigation and drainage engineering and hydraulic structures.
Learning Outcome A3	Know the processes of water and wastewater treatment, solid waste management and control of air, soil and water pollution.

Learning Outcome A4	Know engineering and environmental standards and specifications, and the principles of engineering project management and economics.
Skills	
Learning Outcome B1	Perform laboratory and field tests and engineering surveying works, analyse their results and write reports.
Learning Outcome B2	Design water supply and sewer networks, irrigation and drainage projects, treatment plants and hydraulic structures.
Learning Outcome B3	Use computers and engineering software (e.g. AutoCAD) in analysis, design and engineering drawing.
Learning Outcome B4	Estimate quantities, prepare specifications and technical reports, and implement and supervise engineering projects.
Ethics	
Learning Outcome C1	Commit to engineering professional ethics and responsibility towards the environment and society.
Learning Outcome C2	Work effectively in teams and communicate effectively orally and in writing.
Learning Outcome C3	Engage in continuous self-learning and keep pace with scientific and technological developments.
Learning Outcome C4	Respect human rights and citizenship values and preserve natural resources and their sustainability.

9. Teaching and Learning Strategies

1. Interactive theoretical lectures using modern presentation tools (Data Show) and smart boards.
2. Practical sessions in laboratories and field applications, with technical report writing.
3. Solving problems and applied examples with student participation; problem-based learning.
4. Project-based learning (diploma project and graduation projects) and teamwork.
5. Field visits to projects, treatment plants and water structures.
6. Seminars, class discussions and cooperative learning.
7. Supporting e-learning through the university platforms (Google Classroom).

10. Evaluation Methods

1. Daily written quizzes, mid-term and final examinations (theoretical and practical).
2. Weekly reports, homework and seminars, in addition to attendance, participation and class activities.
3. Assessment of laboratory, practical and field reports.
4. Defence of the diploma project and graduation projects and research.

Credits

Northern Technical University is following the Bologna Process with the European Credit Transfer System (ECTS) credit system. The total degree program number of ECTS is 240, 30 ECTS per semester. 1 ECTS is equivalent to 25 hrs student workload, including structured and unstructured workload.

Grading

Before the evaluation, the results are divided into two subgroups: pass and fail. Therefore, the results are independent of the students who failed a course. The grading system is defined as follows:

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

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

Calculation of the Cumulative Grade Point Average (CGPA)

The CGPA is calculated by the summation of each module score multiplied by its ECTS, all are divided by the program total ECTS.

CGPA of a 4-year B.Sc. degree:

$$\text{CGPA} = [(1\text{st module score} \times \text{ECTS}) + (2\text{nd module score} \times \text{ECTS}) + \dots] / 240$$

11. Faculty

The academic staff of the Department of Environment and Water Resources Engineering techniques consists of highly qualified and experienced professionals dedicated to delivering quality education and conducting impactful research in the field. The department's academic staff comprises individuals with diverse expertise and specializations, providing students with a well-rounded and comprehensive learning experience. The faculty members possess advanced degrees in areas such as irrigation and drainage engineering, hydraulic engineering, water resources management and geotechnical engineering. Their collective knowledge and expertise enable them to cover a wide range of subjects related to Environment, water resources engineering, and associated disciplines. The academic staff is actively engaged in research, contributing to advancements in the field and bringing their up-to-date knowledge into the classroom. They mentor and guide students, fostering a supportive learning environment that encourages critical thinking, innovation, and academic excellence. Through their dedication to teaching, research, and industry collaboration, the academic staff of the Department of Environmental and Water Resources Engineering plays a crucial role in shaping the future professionals in the field and addressing the challenges of water management and infrastructure development. The following table shows the information of academic staff of the department.

Faculty Members

No.	Name and Academic Rank	Specialization		Number of the teaching staff	
		General	Special	Staff	Lecturer

1	Asst. Prof Dr. Maha Mohamed Taha Hassan maha.mohammed@ntu.edu.iq	Biology/Plants	Biology/ Fungi	Staff	
2	Asst. Prof. Dr. Adnan Abdul Wahab Ismail adnan.ismael@ntu.edu.iq	Civil Engineering	Hydraulic	Staff	
3	Asst. Prof. Dr. Mohammad Akram Saadi Ayoub Al-Dabbagh mohamed.akram@ntu.edu.iq	Water Resources Engineering	Civil engineering/water resources	Staff	
4	Ass. Prof. Abdullah Ahmed Sheikho Abidallah.shekho@ntu.edu.iq	Irrigation and Drainage Engineering	Water resources engineering	Staff	
5	Lect. Ahmed Azhar Thanoun ahmedalnamey@ntu.edu.iq	Water Resources Engineering	Irrigation and drainage	Staff	
6	Assist. Lect. Rana Mohamed Abdel mti.lec274.rana@ntu.edu.iq	Dams and Water Resources Engineering	Hydrology	Staff	
7	Assist. Lect. Bushra Zidane Khalil bushra.agha@ntu.edu.iq	Environmental Sciences and Technologies	Sciences in environmental sciences	Staff	

Technical and Administrative Staff

No.	Full Name	Certificate	Title	Specialization	Current Position
1	Asmaa Ibrahim Shaker	Diploma	Senior Technical Manager	Office Management	Polytechnic College/ Mosul
2	Esmat Arif Mohamed	Diploma	Senior Technical	Mechanics	Polytechnic College/ Mosul
3	Omar Shaaban Hassan	Bachelor's	Chief Engineer	Water Resources	Polytechnic College/ Mosul
4	Safa Abdel Moheb Abdel Qader	Bachelor's	Programmer	Computer Science	Polytechnic College/ Mosul
5	Marwa Khairy Maged	Bachelor's	Assistant Engineer	Water Resources	Polytechnic College/ Mosul
6	Mina Talat Hussein	Bachelor's	Engineer Technical	Building and Construction Technology	Polytechnic College/ Mosul
7	Alaa Ahmed Ayoub Abdul	Diploma	Chief Technical Trainers	Building and Construction	Polytechnic College/ Mosul

8	Mohamed Abdel Mohsen Sheet	Bachelor's	Assistant Chief Agriculture Engineer	Agriculture/Horticulture and Gardens	Polytechnic College/ Mosul
9	Kanaan Shaaban Abd	Bachelor's	Translator	English Language	Polytechnic College/ Mosul

Professional Development

Mentoring new faculty members

1. Enrolling new faculty in teaching-methods and educational qualification courses organized by the university Continuing Education Centre.
2. Assigning each new faculty member to an experienced colleague who follows up the preparation of lectures, laboratories and assessment methods.
3. Introducing them to the Bologna system (ECTS), course description forms and quality assurance requirements.
4. Courses on writing and publishing scientific research.

Professional development of faculty members

1. Training courses in the field of specialization and in modern engineering software.
2. Developing scientific publishing skills in peer-reviewed journals and international databases.
3. Participation in conferences, symposia and workshops related to environmental and water resources engineering.
4. Sending faculty members for training inside and outside Iraq.
5. Conducting field and applied research related to water and environmental problems.
6. Scientific twinning with peer universities and colleges.
7. Annual evaluation of faculty performance using quality assurance forms and student evaluation of instructors.

12. Acceptance Criterion

1. Central admission through the Ministry of Higher Education and Scientific Research for preparatory-school graduates (scientific/applied branch) and relevant vocational preparatory graduates.
2. The minimum average set annually by the Ministry and the admission capacity of the department.
3. Admission of top graduates of technical institutes in related specializations according to ministry instructions.
4. Admission to evening and parallel study according to the applicable regulations.
5. Passing the medical examination and interview according to university instructions.

13. The Most Important Sources of Information about the Program

1. The university guide and the websites of Northern Technical University (ntu.edu.iq) and the college.
2. The Academic Program and Course Description Guide issued by the Directorate of Quality Assurance and Academic Accreditation.
3. The approved curricula according to the Bologna Process and ministry instructions.
4. Textbooks, scientific references and teaching packages.
5. External sources (internet, Iraqi Virtual Science Library) and recent scientific research.

14. Program Development Plan

1. Periodic updating of curricula in line with labour-market requirements, scientific developments and the Bologna Process.
2. Developing the teaching laboratories of the department and equipping them with modern devices.
3. Introducing modern engineering software in teaching (water network modelling, hydrology, GIS).
4. Completing the requirements of national program accreditation.
5. Participation in scientific conferences and workshops inside and outside Iraq.
6. Hosting experts from universities and relevant institutions in the field of specialization.
7. Strengthening partnerships with water resources, environment and water & sewerage directorates to provide summer training and job opportunities for graduates.

Program Skills Outline															
				Required program Learning outcomes											
Year/Level	Course Code	Course Name	Basic or optional	Knowledge				Skills				Ethics			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4
First Year – Semester 1	EWRT 100	Soil Physics	Basic	✓	✓			✓						✓	✓
	EWRT 101	Environmental Chemistry	Basic	✓		✓		✓				✓			✓
	EWRT 102	Engineering Mechanics (Statics)	Basic	✓					✓					✓	
	MPE 100	Mathematics I	Basic	✓						✓				✓	
	EWRT 103	Microbiology	Basic	✓		✓		✓							✓
	NTU 100	Human Rights and Democracy	Basic									✓	✓		✓
	NTU 101	English Language	Basic								✓		✓	✓	
First Year – Semester 2	EWRT 104	Dynamics	Basic	✓					✓					✓	
	MPE 101	Engineering Drawing	Basic	✓						✓	✓		✓		
	EWRT 105	Environmental Geology	Basic	✓	✓			✓							✓
	MPE 102	Mathematics II	Basic	✓						✓				✓	
	EWRT 106	Introduction to Water Resources Engineering	Basic	✓	✓							✓			✓
	NTU 102	Computer	Basic							✓				✓	
	NTU 103	Arabic Language	Basic								✓		✓	✓	
Second Year – Semester 3	EWRT 107	Fluid Mechanics	Basic	✓	✓			✓					✓		
	EWRT 108	Engineering Surveying	Basic		✓			✓			✓		✓		

	EWRT 109	Water Supply Networks	Basic		✓	✓			✓	✓		✓			
	EWRT 110	Building Construction	Basic				✓		✓		✓	✓			
	EWRT 111	Solid Waste Engineering	Basic			✓			✓			✓			✓
	EWRT 112	Diploma Project	Basic				✓		✓	✓	✓		✓	✓	
	NTU 200	Crimes of Baath Party	Basic									✓			✓
Second Year – Semester 4	EWRT 113	Engineering Hydrology	Basic		✓			✓	✓					✓	
	EWRT 114	Strength of Materials	Basic	✓				✓	✓					✓	
	EWRT 115	Soil Mechanics	Basic	✓	✓			✓					✓		
	EWRT 116	Water Quality Engineering	Basic			✓		✓				✓			✓
	EWRT 117	Drainage Engineering	Basic		✓				✓						✓
	NTU 201	Professional Ethics	Basic				✓					✓	✓		
Third Year – Semester 5	EWRT 118	Sewer Networks	Basic			✓			✓	✓		✓			
	EWRT 119	Air Pollution Control	Basic			✓			✓			✓			✓
	EWRT 120	Advanced Surface Hydrology	Basic		✓			✓		✓				✓	
	EWRT 121	Hydraulics Applications	Basic		✓			✓	✓					✓	
	EWRT 122	Survey Applications	Basic		✓			✓		✓	✓		✓		
Third Year – Semester 6	EWRT 123	Environmental Thermodynamics	Basic	✓		✓		✓						✓	
	EWRT 124	Numerical Analysis	Basic	✓						✓				✓	
	EWRT 125	Reinforced Concrete	Basic	✓			✓		✓			✓			
	EWRT 126	Wastewater Treatment Plant Design	Basic			✓			✓		✓	✓			✓

	EWRT 127	Groundwater Hydrology	Basic		✓			✓		✓					✓
	EWRT 128	Foundation Engineering	Basic	✓			✓	✓	✓			✓			
Fourth Year – Semester 7	EWRT 129	Design of Water Treatment Plants	Basic			✓			✓		✓	✓			✓
	EWRT 130	Design of Hydraulic Structures I	Basic		✓				✓	✓		✓			
	EWRT 131	Soil and Ground Water Pollution	Basic			✓		✓				✓			✓
	EWRT 132	Open Channels	Basic		✓			✓	✓					✓	
	EWRT 133	Design of Gravity Irrigation Systems	Basic		✓				✓		✓				✓
	EWRT 134	Engineering Project I	Basic				✓		✓	✓	✓		✓	✓	
Fourth Year – Semester 8	EWRT 135	Engineering Project Management and Economy	Basic				✓				✓	✓	✓		
	EWRT 136	Design of Irrigation and Drainage Networks	Basic		✓				✓	✓					✓
	EWRT 137	Design of Sprinkler and Drip Irrigation Systems	Basic		✓				✓	✓					✓
	EWRT 138	Design of Hydraulic Structures II	Basic		✓				✓	✓		✓			
	EWRT 139	Estimation and Specifications	Basic				✓				✓	✓			
	EWRT 140	Engineering Project 2	Basic				✓		✓	✓	✓		✓	✓	

• Please tick (✓) the boxes corresponding to the individual program learning outcomes under evaluation.

Course Descriptions – First Year

Course Description Form

1. Course Name:	
Soil Physics	
2. Course Code:	
EWRT 100	
3. Semester / Year:	
Semester 1 / First Year – Academic Year 2025-2026	
4. Description Preparation Date:	
2/9/2025	
5. Available Attendance Forms:	
In-person attendance (Face to Face) – Language of instruction: Arabic	
6. Number of Credit Hours (Total) / Number of Units (Total)	
Number of units (ECTS): 6 ECTS Weekly hours: 4 hrs (theory 2 + practical 2) Student workload: structured (SSWL) 63 h/sem + unstructured (USSWL) 87 h/sem = 150 h/sem	
7. Course administrator's name (mention all, if more than one name)	
Name: Asst. Prof. Dr. Abdalnaser Kashmoola Email: —	
8. Course Objectives	
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	Introducing the student to the importance of soil physics and its impact on calculating water consumption and water management 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.
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10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	Student understands and applies the material	Introducing the student to the ABCs of soil physics	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
2	4	Student understands and applies the material	Introducing the student to the basic properties of soil physics	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
3	4	Student understands and applies the material	Introducing the student to the mathematical relationships of volume and mass	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
4	4	Student understands and applies the material	Introducing the student to the most important methods of measuring water flow in the soil.	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
5	4	Student understands and applies the material	Introducing the student to methods for measuring soil moisture content	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
6	4	Student understands and applies the material	Introducing the student to how to calculate potentials in the soil Monitors and conducts Standard tests & specification.	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
7	4	Student understands and applies the material	Introducing the student to how to calculate the soil moisture curve	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
8	4	Student understands and applies the material	Introducing the student to how to measure water flow to saturated soil	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion

9	4	Student understands and applies the material	Introducing the student to Darcy's law.	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
10	4	Student understands and applies the material	Introducing the student to calculating the hydraulic conductivity and permeability of soil	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
11	4	Student understands and applies the material	Introducing students to calculating water flow in unsaturated soil	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
12	4	Student understands and applies the material	Introducing students to methods of using general equations of flow	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
13	4	Student understands and applies the material	Introducing the student to surface tension and its practical applications	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
14	4	Student understands and applies the material	Introducing the student to shear stress and methods of measuring it	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
15	4	Student understands and applies the material	Introducing the student to soil sorptivity and methods for measuring it	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion

11. Course Evaluation

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

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)	Hillel, D. (2004). Introduction to Environmental Soil Physics. Academic Press.
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Main references (sources)	Jury, W.A. & Horton, R. (2004). Soil Physics, 6th ed. Wiley.
Recommended books and references (scientific journals, reports...)	Relevant peer-reviewed scientific journals and lecture notes prepared by the instructor.
Electronic References, Websites	Northern Technical University e-learning platforms (ntu.edu.iq) and Google Classroom; Iraqi Virtual Science Library (ivsl.org); open courseware such as NPTEL and MIT OpenCourseWare.

Course Description Form

1. Course Name:			
Environmental Chemistry			
2. Course Code:			
EWRT 101			
3. Semester / Year:			
Semester 1 / First Year – Academic Year 2025-2026			
4. Description Preparation Date:			
2/9/2025			
5. Available Attendance Forms:			
In-person attendance (Face to Face) – Language of instruction: English			
6. Number of Credit Hours (Total) / Number of Units (Total)			
Number of units (ECTS): 4 ECTS Weekly hours: 4 hrs (theory 2 + practical 2) Student workload: structured (SSWL) 63 h/sem + unstructured (USSWL) 37 h/sem = 100 h/sem			
Student Workload (SWL)			
Structured SWL (h/sem)	63	Structured SWL (h/w)	5.2
Unstructured SWL (h/sem)	37	Unstructured SWL (h/w)	4.8
Total SWL (h/sem)			100
7. Course administrator's name (mention all, if more than one name)			
Name: Asst. Prof. Dr. Maha Mohamed Taha Hassan Email: maha.mohammed@ntu.edu.iq			
8. Course Objectives			
Course Objectives	Course Objectives The emphasis in lectures is on the chemical, physical, and biological unit processes that used in the professional practice of environmental engineering (water treatment, wastewater treatment, and soil remediation). The study of various physical, chemical and biological operations and processes Topics covered will be selected from areas such as reactor hydrodynamics, oxidation- reduction, coagulation-flocculation, chemical precipitation, ion exchange, adsorption process, biological oxidation, anaerobic digestion, activated sludge. The course will emphasize incorporating sustainability into design, with emphasis on reducing energy consumption and environmental impacts while increasing operations ease. The emphasis in homework assignments is for students to appreciate the role of each treatment unite in treatment train and then to recommend specific design criteria given different		

treatment goals and challenges. Upon completion, students should be able to describe the purpose and major design elements of each step of a conventional water and wastewater treatment plant. Students should also be able to compile basic knowledge about unit operation processes and to evaluate new technologies and make critical judgments as to their application and sustainability based on gained knowledge

Learning Outcomes

To understand the historical purpose of municipal wastewater treatment and to describe the need for moving beyond treatment toward resource recovery.

To describe the composition and characteristics of municipal wastewater and to specify what treatment process is required for each constituent

To describe the relationship between biological competition of specific species and effluent clarity and quality.

To discuss the relationship between wastewater composition, microbial growth rate, and biosolids management.

To describe the common measurements for treatment plant performance ,develop solve design problems and analyze the data to evaluate the feasibility of the main components of water and wastewater treatment plants (ii).

Report the data obtained from the site visits to WTP and WWTP that will be organized during the course (iv)

Formulate the mass balance principles, and applying Modeling for treatment process kinetics involving mass transfer and Gas-Liquid masstransfer. (ii).

Practical Part

Introduction to unit operation and processes in water and wastewater ,combination of unit operation and processes in treatment process train .

Physical unit operation:

screening, comminutors , grit removal, mixing & flocculation , energy dissipation in mixing, type of mixers, sedimentation flotation, oxygen transfer membranes processes , Reverse osmosis , ion exchanges, Adsorption & absorption fundamental , filtration.

Chemical unit operations:-

Chemical Coagulation, Colloidal destabilization, Chemical precipitation, disinfection

Reaction kinetics and reactors:

Reactions types, Reaction order, Reaction rates, Types of reactors, ,mass balance principle, Modeling treatment process kinetics, Treatment process involving mass transfer, Gas-Liquid mass transfer, Two film theory Liquid- Solid mass, Introduction of activated sludge process & kinetics , trickling filterrotary biological disc , Phosphorus removal , nitrification & denitrification.

Biological unit operations Microbial metabolism, Microbial growth kinetics, Aerobic biological oxidation, Anaerobic fermentation and oxidation Aerobic biological oxidation, Anaerobic fermentation and oxidation.

9. Teaching and Learning Strategies

Strategy	Interactive theoretical lectures using the whiteboard and modern presentation tools (Data Show). Solving problems and applied examples with student participation to develop critical thinking and problem-solving skills. Practical sessions in the laboratory/field and writing technical reports on the experiments. Homework, quizzes and reports, supported by e-learning platforms (Google Classroom).
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10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	Student understands and applies the material	Introduction to unit operations and processes in water and wastewater; combination of unit operations and processes in the treatment process train.	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
2	4	Student understands and applies the material	Physical unit operations: screening, comminutors, grit removal.	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
3	4	Student understands and applies the material	Mixing and flocculation, energy dissipation in mixing, types of mixers, sedimentation and flotation, oxygen transfer.	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
4	4	Student understands and applies the material	Membrane processes, reverse osmosis, ion exchange.	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
5	4	Student understands and applies the material	Adsorption and absorption fundamentals, filtration.	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
6	4	Student understands and applies the material	Chemical unit operations: chemical coagulation, colloidal destabilization.	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion

7	4	Student understands and applies the material	Chemical precipitation, disinfection.	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
8	4	Student understands and applies the material	Reaction kinetics and reactors: reaction types, reaction order, reaction rates, types of reactors.	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
9	4	Student understands and applies the material	Mass balance principle, modelling treatment process kinetics.	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
10	4	Student understands and applies the material	Treatment processes involving mass transfer: gas-liquid mass transfer, two-film theory, liquid-solid mass transfer.	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion

11. Course Evaluation

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

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

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Sawyer, C.N., McCarty, P.L. & Parkin, G.F. (2003). Chemistry for Environmental Engineering and Science, 5th ed. McGraw-Hill.
Main references (sources)	Manahan, S.E. Environmental Chemistry. CRC Press.

Recommended books and references (scientific journals, reports...)	Relevant peer-reviewed scientific journals and lecture notes prepared by the instructor.
Electronic References, Websites	Northern Technical University e-learning platforms (ntu.edu.iq) and Google Classroom; Iraqi Virtual Science Library (ivsl.org); open courseware such as NPTEL and MIT OpenCourseWare.

Note: The weekly syllabus (weeks 1–10) and the module evaluation of this course were transcribed from images embedded in the original file.

Course Description Form

1. Course Name:	
Engineering Mechanics (Statics)	
2. Course Code:	
EWRT 102	
3. Semester / Year:	
Semester 1 / First Year – Academic Year 2025-2026	
4. Description Preparation Date:	
2/9/2025	
5. Available Attendance Forms:	
In-person attendance (Face to face)	
6. Number of Credit Hours (Total) / Number of Units (Total)	
Number of units (ECTS): 6 ECTS Weekly hours: 3 hrs (theory 2 + practical 1) Student workload: structured (SSWL) 78 h/sem + unstructured (USSWL) 72 h/sem = 150 h/sem	
7. Course administrator's name (mention all, if more than one name)	
Name: To be assigned by the Head of Department Email: —	
8. Course Objectives	
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 student

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 force system and resultat.	Theoretical lectures in class	HW & Exam
3	4	3- Result of the converging forces, 4- Moment force	Converging forces and moment	Theoretical lectures in class	HW & Exam
4	4	5- couples, Problem solving + Quiz 1	Couples	Theoretical lectures in class	HW & Exam
5	4	6- The result of non-converging forces	Non-converging forces	Theoretical lectures in class	HW & Exam
6	4	Equilibrium. 1-concept of Equilibrium, 2- free body diagram, 3- Balance of parallel forces + Quiz 2	Equilibrium	Theoretical lectures in class	HW & Exam
7	4	- 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 fram	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	Principles of force system and resultat.	Theoretical lectures in class	Quiz, homework, discussion

11. Course Evaluation

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

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)	Hibbeler, R.C. Engineering Mechanics: Statics. Pearson.
Main references (sources)	Meriam, J.L. & Kraige, L.G. Engineering Mechanics: Statics. Wiley.
Recommended books and references (scientific journals, reports...)	Relevant peer-reviewed scientific journals and lecture notes prepared by the instructor.
Electronic References, Websites	Northern Technical University e-learning platforms (ntu.edu.iq) and Google Classroom; Iraqi Virtual Science Library (ivsl.org); open courseware such as NPTEL and MIT OpenCourseWare.

Course Description Form

1. Course Name:			
Mathematics I			
2. Course Code:			
MPE 100			
3. Semester / Year:			
Semester 1 / First Year – Academic Year 2025-2026			
4. Description Preparation Date:			
2/9/2025			
5. Available Attendance Forms:			
In-person attendance (Face to Face) – Language of instruction: English			
6. Number of Credit Hours (Total) / Number of Units (Total)			
Number of units (ECTS): 6 ECTS Weekly hours: 5 hrs (theory 3 + practical 2) Student workload: structured (SSWL) 78 h/sem + unstructured (USSWL) 72 h/sem = 150 h/sem			
Student Workload (SWL)			
Structured SWL (h/sem)	78	Structured SWL (h/w)	5.3
Unstructured SWL (h/sem)	72	Unstructured SWL (h/w)	4.7
Total SWL (h/sem)			150
7. Course administrator's name (mention all, if more than one name)			
Name: Asst. Prof. Dr. Mohammad Akram Saadi Ayoub Al-Dabbagh Email: mohamed.akram@ntu.edu.iq			
8. Course Objectives			
Course Objectives	Learning Outcomes CLO-1: Recognize fundamentals of math and the emphasis on functions and graphs(i). Modify menu (erase, copy, mirror, offset, move, rotate, trim, extend, explode) Perspective CLO-2: understanding various limit problems both algebraically and graphically and using it by checking the continuity of various types of functions(i). Orthographic projection: First and third angle projection method CLO-3: Finding the derivative of various types of functions using the differentiation rules (i). CLO-4: Applying differentiation to find linear approximation and optimization problems(ii)		

	CLO-5:solve matrices and operations on matrices and using matrices in solving linear equations(i). Indicative Contents / Practical Part Part A – Prerequisites for calculus Coordinates and Graphs in the Plane, Slope and Equations for Lines, Functions and Their Graphs, Shifts, Circles and Parabolas, A Review of Trigonometric Functions (17 hrs). Part B – Limits and Continuity Limits, The Sandwich Theorem and $(\sin \theta)/\theta$, Limits Involving Infinity, Continuous Functions. (10 hrs). Part C – Derivatives Slope, Tangent Lines, and Derivatives, Differentiation Rules, Velocity, Speed and Other Rate of Change, Derivatives of Trigonometric Functions, The Chain Rule, Implicit Differentiation and Fractional Powers, Linear Approximations and Differentials (17 hrs). Part D - Applications of Derivatives Related Rates of Change, Maximal, Minima and the Mean Value Theorem, Curve Sketching with y', y'', Graphing Rational Functions-Asymptotes and Dominant Terms, Optimization (18 hrs.). Part E - Matrices Operation on matrices, Equal matrices, Addition and Subtraction of matrices, Multiplication by scalar, Multiplication of matrices, Transpose of a matrices, adjoin of a square matrix, Determinants, Properties of determinants, Singular matrix, Solution of system of equations by matrix inversion, Cramer's rule to solve the system of equations, Gaussian elimination. (18hrs).
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9. Teaching and Learning Strategies

Strategy	Expanding students' perceptions of mathematic, familiarity with basic mathematical concepts and principles, and the ability to distinguish between different mathematical concepts. This course has several components that include studying lectures, tutorial, discussion, homework, and e-learning platforms. The course will be taught in English, and all compulsory assignments have to be submitted within the deadlines to be admitted to the exam.
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10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	5	Student understands and applies the material	Coordinates and Graphs in the Plane, Slope and Equations for Lines.	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
2	5	Student understands and applies the material	Functions and Their Graphs, shifts, circles and parabolas.	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion

3	5	Student understands and applies the material	A review of trigonometric functions.	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
4	5	Student understands and applies the material	Limits, the sandwich theorem and $(\sin \theta)/\theta$, limits involving infinity	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
5	5	Student understands and applies the material	Continuous functions.	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
6	5	Student understands and applies the material	Slope, tangent lines, and derivatives, differentiation rules, velocity, speed and other rate of change.	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
7	5	Student understands and applies the material	Derivatives of trigonometric functions.	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
8	5	Student understands and applies the material	The chain rule, implicit differentiation and fractional powers, linear approximations and differentials.	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
9	5	Student understands and applies the material	Related rates of change.	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
10	5	Student understands and applies the material	Maximal, minima and the mean value theorem, curve sketching with y' , y'' .	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
11	5	Student understands and applies the material	Graphing Rational Functions-Asymptotes and Dominant Terms.	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion

12	5	Student understands and applies the material	Optimization.	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
13	5	Student understands and applies the material	Operation on matrices, Equal matrices, Addition and Subtraction of matrices, Multiplication by scalar, Multiplication of matrices,	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
14	5	Student understands and applies the material	Transpose of a matrices, adjoint of a square matrix, Determinants, Properties of determinants and Singular matrix.	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
15	5	Student understands and applies the material	Solution of system of equations by matrix inversion, Cramer's rule, Gaussian elimination.	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
16	5	Student understands and applies the material	Preparatory week before the final Exam	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion

11. Course Evaluation

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

		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	5	5% (25)	3, 5, 8, 11 and 14	CLO-1, CLO-2, CLO-3, CLO-4, CLO-5
Formative assessment	Online Assignments	1	2% (2)	6	CLO-1, CLO-2.
Formative assessment	Onsite Assignment	5	2% (10)	3, 6, 9, 12 and 15	CLO-1, CLO-2, CLO-3, CLO-4, CLO-5.
Formative assessment	Projects / Lab.	0	0	0	
Formative assessment	Report	1	3% (3)	12	CLO-1, CLO-2, CLO-3, CLO-4.

Summative assessment	Midterm Exam	2hrs	10% (10)	9	CLO-1, CLO -2, CLO -3,
	Final Exam	3hrs	50% (50)	16	All
Total assessment			100% (100 Marks)		

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Thomas, G.B., Weir, M.D. & Hass, J. Thomas' Calculus. Pearson.
Main references (sources)	Kreyszig, E. Advanced Engineering Mathematics. Wiley.
Recommended books and references (scientific journals, reports...)	Relevant peer-reviewed scientific journals and lecture notes prepared by the instructor.
Electronic References, Websites	Northern Technical University e-learning platforms (ntu.edu.iq) and Google Classroom; Iraqi Virtual Science Library (ivsl.org); open courseware such as NPTEL and MIT OpenCourseWare.

Course Description Form

1. Course Name:			
Microbiology			
2. Course Code:			
EWRT 103			
3. Semester / Year:			
Semester 1 / First Year – Academic Year 2025-2026			
4. Description Preparation Date:			
2/9/2025			
5. Available Attendance Forms:			
In-person attendance (Face to Face) – Language of instruction: English			
6. Number of Credit Hours (Total) / Number of Units (Total)			
Number of units (ECTS): 4 ECTS Weekly hours: 4 hrs (theory 2 + practical 2) Student workload: structured (SSWL) 63 h/sem + unstructured (USSWL) 37 h/sem = 100 h/sem			
Student Workload (SWL)			
Structured SWL (h/sem)	63	Structured SWL (h/w)	4.2
Unstructured SWL (h/sem)	37	Unstructured SWL (h/w)	4.1
Total SWL (h/sem)			100
7. Course administrator's name (mention all, if more than one name)			
Name: Alaa Imad Hamid Email: —			
8. Course Objectives			
Course Objectives	Course Objectives In Environmental Microbiology, initially students will learn how to deal with different types of microorganisms and it's useful in designing wastewater and water treatment plant. Upon successful completion of this course the student shall be able number of study weeks. Learning Outcomes CLO-1: How classify the microorganism. CLO-2: The structure of microorganism. CLO-3: Bacterial Morphologies. CLO-4: Identification of microorganisms and their activities. CLO-5: How to disinfect drinking water from pathogens. CLO-6: How to induce water pollution by pathogens. CLO-7: How waste water is treated biologically using microorganisms. CLO-8: Factors affecting on microorganisms.		

	CLO-9: Learning everything regarding microorganisms that may be need them in other environmental engineering subjects in next stages. CLO-10: How to use the microscope. CLO-11: How to test the pollution indicators in water. CLO-12: How to test E. Coli in water samples. CLO-13: Gram staining procedure. Indicative Contents Part A: Introduction to Microbiology as a science Microorganisms as cells Microorganisms and their natural environments Impact of microorganisms on humans A brief history of microbiology and recent advances. Part B: The scope of microbial diversity is enormous and microorganisms have exploited every means of making a living consistent with the laws of chemistry and physics Part C: The “Central Dogma” relates how biological information flows through a cell by a series of macromolecules that are governed by chemical actions. Part D: Microbial ecology – study of the interaction of microorganisms with each other and their environment .
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9. Teaching and Learning Strategies

Strategy	To enhance the understanding of microbial function in engineering system, initially students must be learned how to deal with different types of microorganisms and it's useful in designing wastewater and water treatment plant. Also microorganisms play an important role in the protection of humans, animals, plants, air, soil, and engineering systems from chemical or biological pollution, deterioration, and corrosion, and in the restoration polluted and degraded environments.
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10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1&2	4	Student understands and applies the material	Introduction to Microbiology Why we are concerning for studying Environmental Microbiology, and Germ theory.	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
3	4	Student understands and applies the material	Classification the microorganisms Studying different types of classifications of microorganisms and Bacterial morphologies.	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion

4&5	4	Student understands and applies the material	Bacterial cell chemistry Studying microorganisms cell structure and cell chemistry.	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
6&7	4	Student understands and applies the material	Bacterial growth in batch system and continuous flow system Expecting the number of generated bacteria and effect of reactor type on it, also substrate and other components effects on the microorganism's activities, as well as mass balance.	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
8	4	Student understands and applies the material	Microorganisms in water and bacterial content The types of pathogens and its indicators, standards specifications of drinking water	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
9	4	Student understands and applies the material	Detection of evidence of water contamination Coliform and fecal bacteria, viruses.	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
10&11	4	Student understands and applies the material	Use the microscope and prepare the slides for examination Laboratory lectures for practical testing	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
12	4	Student understands and applies the material	Most probability number test for coliform bacteria The most important test for environmental engineers for pollution indicators	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
13&14	4	Student understands and applies the material	Biological treatment Role of microorganisms in biological treatment of wastewater and the factors that effect on microorganisms activities in wastewater.	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion

15	4	Student understands and applies the material	Review before the final Exam	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
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Delivery Plan (Weekly Lab. Syllabus)

1	Lab Safety
2	Microscopes
3	Bacteria morphology
4	Total number of bacteria
5	Detection of coliform bacteria

11. Course Evaluation

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

		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	16% (16)	2, 3, 12 and 14	CLO-1, CLO-2, CLO-3, CLO-5
Formative assessment	Assignment	5	12% (12)	2, 3, 4, 6, and 10	CLO-2, CLO-2, CLO-3, CLO-2, CLO-3
Formative assessment	Projects / Lab.	6	8% (8)	13	CLO-2 to CLO-6
Formative assessment	Report	1	4% (4)		All
Formative assessment	Midterm Exam	2hrs	10% (10)	7	CLO-1, CLO -2 and CLO-3
Summative assessment	Final Exam	3hrs	50% (50)	16	All
			100% (100 Marks)		

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Maier, R.M., Pepper, I.L. & Gerba, C.P. Environmental Microbiology. Academic Press.
Main references (sources)	Madigan, M.T. et al. Brock Biology of Microorganisms. Pearson.
Recommended books and references (scientific journals, reports...)	Relevant peer-reviewed scientific journals and lecture notes prepared by the instructor.

Electronic References, Websites	Northern Technical University e-learning platforms (ntu.edu.iq) and Google Classroom; Iraqi Virtual Science Library (ivsl.org); open courseware such as NPTEL and MIT OpenCourseWare.
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Course Description Form

1. Course Name:			
Human Rights and Democracy			
2. Course Code:			
NTU 100			
3. Semester / Year:			
Semester 1 / First Year – Academic Year 2025-2026			
4. Description Preparation Date:			
2/9/2025			
5. Available Attendance Forms:			
In-person attendance (Face to Face) – Language of instruction: Arabic			
6. Number of Credit Hours (Total) / Number of Units (Total)			
Number of units (ECTS): 2 ECTS Weekly hours: 2 hrs (theory 2 + practical 0) Student workload: structured (SSWL) 33 h/sem + unstructured (USSWL) 17 h/sem = 50 h/sem			
Workload for Learning & Teaching Activities			
Type of Learning Activity	Activities (# per week)	Duration (h)	Workload (h)
Lecture & In-Class Activities	15	2	30
Assignment (Homework)	3	1	3
Seminar	3	1	3
Report Writing	1	1	1
Final Exam	1	3	3
Preparation for the Final Exam	1	5	5
Mid-Term Exam	1	2	2
Preparation for the Mid-Term Exam	1	3	3
Short Exam	2	0.5	1
Preparation for the Short Exam	2	0.5	1
TOTAL	30	19	52
Total Workload of the Course Unit			52
Workload (h) / 25			2.08
ECTS Credits allocated for the Course Unit			2
7. Course administrator's name (mention all, if more than one name)			
Name: Asst. Prof. Dr. Abdalnaser Kashmoola Email: —			

8. Course Objectives					
Course Objectives	Course Objectives Introduce the concept, objectives and historical development of human rights since the ancient civilizations. Identify human rights in the divine laws and in international and regional charters. Understand constitutional and legal guarantees of human rights and the mechanisms for their protection. Promote the values of democracy, citizenship and respect for others among students.				
9. Teaching and Learning Strategies					
Strategy	Interactive lectures using modern presentation tools (Data Show). Dialogue, discussion and thought-provoking questions to encourage class participation. Reports, seminars and class activities supported by e-learning platforms.				
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Student understands and applies the material	حقوق الانسان ، تعريفها ، اهدافها حقوق الانسان في الحضارات القديمة وخصوصا حضارة وادي الرافدين	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
2	2	Student understands and applies the material	حقوق الانسان في الشرائع السماوية مع التركيز على حقوق الانسان في الاسلام	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
3	2	Student understands and applies the material	حقوق الانسان في التاريخ المعاصر والحديث : الاعتراف الدولي بحقوق الانسان منذ الحرب العالمية الأولى وعصبة الامم المتحدة	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
4	2	Student understands and applies the material	الاعتراف الاقليمي بحقوق الانسان : الاتفاقية الاوربية لحقوق الانسان ١٩٥٠ ، الاتفاقية الامريكية لحقوق الانسان ١٩٦٩ ، الميثاق الافريقي لحقوق الانسان ١٩٨١ ، الميثاق العربي لحقوق الانسان ١٩٩٤	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
5	2	Student understands and applies the material	المنظمات غير الحكومية وحقوق الانسان (اللجنة الدولية للصليب الاحمر ، منظمة العفو الدولية ، منظمة مراقبة حقوق الانسان ، المنظمات الوطنية لحقوق الانسان)	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion

6	2	Student understands and applies the material	حقوق الانسان في الدساتير العراقية بين النظرية والواقع	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
7	2	Student understands and applies the material	العلاقة بين حقوق الانسان والحريات العامه : ١- في الاعلان العالمي لحقوق الانسان ٢- في المواثيق الاقليمية والدساتير الوطنية	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
8	2	Student understands and applies the material	حقوق الانسان الاقتصادية والاجتماعية والثقافية و حقوق الانسان المدنية والسياسية	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
9	2	Student understands and applies the material	حقوق الانسان الحديثة : الحقائق في التنمية ، الحق في البيئة النظيفة ، الحق في التضامن ، الحق في الدين	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
10	2	Student understands and applies the material	ضمانات احترام وحماية حقوق الانسان على الصعيد الوطني ، الضمانات في الدستور والقوانين ، الضمانات في مبدأ سيادة القانون الضمانات في الرقابة الدستورية ، الضمانات في حرية الصحافة والرأي العام ، دور المنظمات غير الحكومية في احترام وحماية حقوق الانسان	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
11	2	Student understands and applies the material	ضمانات واحترام وحماية حقوق الانسان على الصعيد الدولي : دور الأمم المتحدة ووكالاتها المتخصصة في توفير الضمانات دور المنظمات الاقليمية (الجامعة العربية ، الاتحاد الأوروبي ، الاتحاد الافريقي ، منظمة الدول الأمريكية ، منظمة آسيان) دور المنظمات الدولية الاقليمية غير الحكومية والرأي العام في احترام وحماية حقوق الانسان	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion

12	2	Student understands and applies the material	النظرية العامة للحريات : أصل الحقوق والحريات ، موقف المشروع من الحقوق والحريات المعلنة ، استخدام مصطلح الحريات العامة	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
13	2	Student understands and applies the material	القاعدة الشرعية لدولة القانون	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
14,15	2	Student understands and applies the material	تنظيم الحريات العامة من قبل السلطات العامة	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion

11. Course Evaluation

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

Evaluation type	Mark
Quizzes	10
Homework and reports	10
Attendance, participation and class activities	10
Mid-term examination	20
Final examination	50
Total	100

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	The approved textbook for Human Rights and Democracy – Ministry of Higher Education and Scientific Research.
Main references (sources)	Universal Declaration of Human Rights (1948); International Covenants (1966); Constitution of the Republic of Iraq (2005).
Recommended books and references (scientific journals, reports...)	Relevant peer-reviewed scientific journals and lecture notes prepared by the instructor.
Electronic References, Websites	Northern Technical University e-learning platforms (ntu.edu.iq) and Google Classroom; Iraqi Virtual Science Library (ivsl.org).

Course Description Form

1. Course Name:			
English Language			
2. Course Code:			
NTU 101			
3. Semester / Year:			
Semester 1 / First Year – Academic Year 2025-2026			
4. Description Preparation Date:			
2/9/2025			
5. Available Attendance Forms:			
In-person attendance (Face to Face) – Language of instruction: English			
6. Number of Credit Hours (Total) / Number of Units (Total)			
Number of units (ECTS): 2 ECTS Weekly hours: 2 hrs (theory 2 + practical 0) Student workload: structured (SSWL) 33 h/sem + unstructured (USSWL) 17 h/sem = 50 h/sem			
Workload for Learning & Teaching Activities			
Type of Learning Activity	Activities (# per week)	Duration (h)	Workload (h)
Lecture & In-Class Activities	15	2	30
Assignment (Homework)	2	1	2
Seminar	2	1	2
Final Exam	1	3	3
Preparation for the Final Exam	1	6	6
Mid-Term Exam	1	2	2
Preparation for the Mid-Term Exam	1	4	4
Short Exam	3	1	3
Preparation for the Short Exam	3	1	3
TOTAL	29	21	55
Total Workload of the Course Unit			55
Workload (h) / 25			2.2
ECTS Credits allocated for the Course Unit			2
7. Course administrator's name (mention all, if more than one name)			
Name: Asst. Prof. Dr. Abdalnaser Kashmoola Email: —			
8. Course Objectives			

Course Objectives	Course Objectives This course is designed to help freshmen better cope with the English-language coursework in their major fields of study by concentrating on reading, critical thinking, vocabulary development and writing. It is aimed to reinforce and expand the students' English competence and performance through textual and structural analysis, i.e., through learning how meaning is communicated by the organization of a text and learning how English syntax contributes to meaning. Indicative Contents This course combines elements of both the strategies approach and the task based approach to language learning. The students are being trained to incorporate materials from several textual sources and to use academic texts critically. Coursework involves reading and analyzing various upper-intermediate and advanced level texts as well as listening activities relevant to the chosen topics Learning Outcomes Identify advanced level of grammar structure. Criticize and interpret the advanced level of reading passages. Develop listening skills. Develop the ability to expand their vocabulary through multiple methods. Compose an essay by developing content, using specific grammatical structures and giving thematically related examples about the given topic.
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9. Teaching and Learning Strategies

Strategy	Interactive lectures using modern presentation tools (Data Show). Dialogue, discussion and thought-provoking questions to encourage class participation. Reports, seminars and class activities supported by e-learning platforms.
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10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Student understands and applies the material	Introduction to the Course Goals, Assignments, Schedule, Criteria, Policies	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
1	2	Student understands and applies the material	Unit 1: The Way We Are Talking about the dysfunctional families, telling and writing a story about an unusual person from the past with Narrative Tenses.	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
2	2	Student understands and applies the material	Managing conversation: Agreeing, Disagreeing and Partially Agreeing	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion

2	2	Student understands and applies the material	Unit 2: Wild World Listening conversations and reading a text about animals and their characteristics and human's attitudes to animals	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
3	2	Student understands and applies the material	Managing conversations on similarities and differences between humans and chimpanzees with using a wide range of Verbs of Senses and Articles	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
4	2	Student understands and applies the material	Unit 3: On the Money Listening to people talking about how they spend money and writing a web article called 'How to be rich'	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
5	2	Student understands and applies the material	Reading an article about money trends, giving and responding to opinions about money issues with the use of Future Forms.	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
6	2	Student understands and applies the material	Reading and analyzing movie review; Hobbits and Other Creatures Studying on Adjective Clauses with Prepositions	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
7	2	Student understands and applies the material	MID-TERM EXAM	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
8	2	Student understands and applies the material	Unit 4: Through The Ages Giving a talk about the uses of and history of plastic. The Passive Structure Using Compound Nouns and Possessive's Writing a paragraph about advantages and disadvantages of internet.	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
9	2	Student understands and applies the material	Unit 5: Island Hopping Managing conversations using Discourse Markers Listening of an interview about a survival TV show Reading the text 'An Unexplained Mystery' Studying on Past Deduction and Speculation	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion

10	2	Student understands and applies the material	Talking about utopian and dystopian stories, films and games. Listening a conversation about dystopian fiction as a study of Pronouns and Substitution. Writing a paragraph comparing science fiction and reality	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
11	2	Student understands and applies the material	Linking Ideas: Present and Past Irregular Plurals, Consonants, There was/were Countable and Uncountable Nouns, Imperatives Healthy Living and habits	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
12	2	Student understands and applies the material	Can for ability Could and Couldn't Skills at work Can for requests Adjectives and Adverbs	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
13	2	Student understands and applies the material	Describing People, Present Continuous and Adjectives Have to/ don't have to Housework, home, school & work obligations	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
14,15	2	Student understands and applies the material	Offering and Inviting Why...? Would you like to...? Let's...? Free time activities	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
14,15	2	Student understands and applies the material	Be going to + infinitive for plans	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
14,15	2	Student understands and applies the material	Be going to weak forms: Maybe/perhaps	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
14,15	2	Student understands and applies the material	Past Simple have to	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion

11. Course Evaluation

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

Evaluation type	Mark
Quizzes	10
Homework and reports	10

Attendance, participation and class activities	10
Mid-term examination	20
Final examination	50
Total	100
12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Soars, J. & Soars, L. New Headway (Student's Book & Workbook). Oxford University Press.
Main references (sources)	Murphy, R. English Grammar in Use. Cambridge University Press.
Recommended books and references (scientific journals, reports...)	Relevant peer-reviewed scientific journals and lecture notes prepared by the instructor.
Electronic References, Websites	Northern Technical University e-learning platforms (ntu.edu.iq) and Google Classroom; Iraqi Virtual Science Library (ivsl.org).

Course Description Form

1. Course Name:			
Dynamics			
2. Course Code:			
EWRT 104			
3. Semester / Year:			
Semester 2 / First Year – Academic Year 2025-2026			
4. Description Preparation Date:			
2/9/2025			
5. Available Attendance Forms:			
In-person attendance (Face to Face) – Language of instruction: English			
6. Number of Credit Hours (Total) / Number of Units (Total)			
Number of units (ECTS): 5 ECTS Weekly hours: 3 hrs (theory 2 + practical 1) Student workload: structured (SSWL) 48 h/sem + unstructured (USSWL) 77 h/sem = 125 h/sem			
Workload for Learning & Teaching Activities			
Type of Learning Activity	Activities (# per week)	Duration (h)	Workload (h)
Lecture & In-Class Activities	15	4	60
Preliminary & Further Study	6	1	6
Group Work	2	1	2
Assignment (Homework)	8	2	16
Web Based Learning	3	1	3
Implementation/Application/Practice	8	1	8
Final Exam	1	3	3
Preparation for the Final Exam	1	15	15
Mid-Term Exam	1	2	2
Preparation for the Mid-Term Exam	1	12	12
Short Exam	8	1	8
Preparation for the Short Exam	6	1	6
TOTAL	60	44	141
Total Workload of the Course Unit			141
Workload (h) / 25			5.64
ECTS Credits allocated for the Course Unit			6
7. Course administrator's name (mention all, if more than one name)			

Name: Asst. Prof. Dr. Mohammad Akram Saadi Ayoub Al-Dabbagh
Email: mohamed.akram@ntu.edu.iq

8. Course Objectives

Course Objectives	Course Objectives Understand Kinematics and Kinetics: Learn the basic laws and principles of plane kinematics and kinetics of particles and rigid bodies. Analyze Motion: Develop skills to analyze rectilinear and curvilinear motion, including position, displacement, velocity, and acceleration. Apply Mathematical Tools: Use mathematical methods to derive equations of motion and plot acceleration, velocity, and displacement versus time
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9. Teaching and Learning Strategies

Strategy	Interactive theoretical lectures using the whiteboard and modern presentation tools (Data Show). Solving problems and applied examples with student participation to develop critical thinking and problem-solving skills. Practical sessions in the laboratory/field and writing technical reports on the experiments. Homework, quizzes and reports, supported by e-learning platforms (Google Classroom).
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10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1,2,3	3	Student understands and applies the material	Demonstrates knowledge and conducts the frames Analysis (method of members)	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
4,5	3	Student understands and applies the material	Demonstrates knowledge Friction, Theory of friction, Types of friction, Wedges, Applications Computes Angle of friction	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
6,7,8	3	Student understands and applies the material	Computes Centroids of areas & lines, Centroids by integration, Centroids of composite areas, Applications.	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion

9	3	Student understands and applies the material	Computes Moment of inertia , Polar moment of inertia , Radius of gyration , Transfer formula for moment of inertia , Moment of inertia for composite areas , Product of inertia , Moment of inertia with respect to inclined axes , Mohr` circle for moment of inertia .	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
10,11	3	Student understands and applies the material	Demonstrates knowledge of the Principles of dynamics, Kinematics & kinetics, Motion of a particle, Able to apply Fundamental Equations of kinetics for a particle, Effective force on a particle.	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
12,13	3	Student understands and applies the material	Demonstrates knowledge of the Rectilinear translation, Rectilinear motion with constant acceleration, Free falling bodies.	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
14,15	3	Student understands and applies the material	Demonstrates knowledge of the Kinetics of rectilinear translation (Analysis as a particle), Dynamic Equilibrium in translation (Analysis as a rigid body).	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion

11. Course Evaluation

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

Evaluation type	Mark
Quizzes	10
Homework and reports	10
Attendance, participation and class activities	10
Mid-term examination	20
Final examination	50
Total	100

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Hibbeler, R.C. Engineering Mechanics: Dynamics. Pearson.
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Main references (sources)	Meriam, J.L. & Kraige, L.G. Engineering Mechanics: Dynamics. Wiley.
Recommended books and references (scientific journals, reports...)	Relevant peer-reviewed scientific journals and lecture notes prepared by the instructor.
Electronic References, Websites	Northern Technical University e-learning platforms (ntu.edu.iq) and Google Classroom; Iraqi Virtual Science Library (ivsl.org); open courseware such as NPTEL and MIT OpenCourseWare.

Course Description Form

1. Course Name:					
Engineering Drawing					
2. Course Code:					
MPE 101					
3. Semester / Year:					
Semester 2 / First Year – Academic Year 2025-2026					
4. Description Preparation Date:					
2/9/2025					
5. Available Attendance Forms:					
In-person attendance (Face to Face) – Language of instruction: English					
6. Number of Credit Hours (Total) / Number of Units (Total)					
Number of units (ECTS): 7 ECTS Weekly hours: 6 hrs (theory 0 + practical 6) Student workload: structured (SSWL) 93 h/sem + unstructured (USSWL) 82 h/sem = 175 h/sem					
7. Course administrator's name (mention all, if more than one name)					
Name: Lect. Ahmed Azhar Thanoun Email: ahmedalnamey@ntu.edu.iq					
8. Course Objectives					
Course Objectives		Course Objectives - use the technical drawing tools properly and to plot pictures according to the dimensions and properties of technical drawing - using scale, types of scales and measurement techniques to drawings. - Increasing the students ability to imagine carrying out the perspective drawings due to views.			
9. Teaching and Learning Strategies					
Strategy		This course has several components that include lectures, classwork, homework and quiz. The course will be taught in English, and all mandatory assignments have be submitted within the deadlines to be admitted to the exams.			
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	6	Student understands and applies the material	Drawing instruments and their use	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion

2	6	Student understands and applies the material	Types of lines, lettering and numbering	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
3	6	Student understands and applies the material	Geometric constructions (bisectors, tangents, arcs)	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
4	6	Student understands and applies the material	Regular shapes and geometric constructions	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
5	6	Student understands and applies the material	Principles of orthographic projection (first and third angle)	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
6	6	Student understands and applies the material	Drawing the three views of solids	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
7	6	Student understands and applies the material	Deriving the missing (third) view	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
8	6	Student understands and applies the material	Mid-term examination	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
9	6	Student understands and applies the material	Sectional views and their types	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
10	6	Student understands and applies the material	Dimensioning and standards	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
11	6	Student understands and applies the material	Isometric drawing	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion

12	6	Student understands and applies the material	Introduction to AutoCAD and basic drawing commands	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
13	6	Student understands and applies the material	AutoCAD modify commands (erase, copy, mirror, offset, move, rotate, trim, extend, explode)	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
14	6	Student understands and applies the material	Computer-aided engineering drawings and dimensioning	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
15	6	Student understands and applies the material	General review and submission of drawing sheets	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion

11. Course Evaluation

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

Evaluation type	Mark
Quizzes	10
Homework and reports	10
Attendance, participation and class activities	10
Mid-term examination	20
Final examination	50
Total	100

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

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Giesecke, F.E. et al. Technical Drawing with Engineering Graphics. Pearson.
Main references (sources)	Autodesk AutoCAD User's Guide.
Recommended books and references (scientific journals, reports...)	Relevant peer-reviewed scientific journals and lecture notes prepared by the instructor.
Electronic References, Websites	Northern Technical University e-learning platforms (ntu.edu.iq) and Google Classroom; Iraqi Virtual Science Library (ivsl.org); open courseware such as NPTEL and MIT OpenCourseWare.

Course Description Form

1. Course Name:			
Environmental Geology			
2. Course Code:			
EWRT 105			
3. Semester / Year:			
Semester 2 / First Year – Academic Year 2025-2026			
4. Description Preparation Date:			
2/9/2025			
5. Available Attendance Forms:			
In-person attendance (Face to Face) – Language of instruction: English			
6. Number of Credit Hours (Total) / Number of Units (Total)			
Number of units (ECTS): 3 ECTS Weekly hours: 2 hrs (theory 2 + practical 0) Student workload: structured (SSWL) 33 h/sem + unstructured (USSWL) 42 h/sem = 75 h/sem			
Workload for Learning & Teaching Activities			
Type of Learning Activity	Activities (# per week)	Duration (h)	Workload (h)
Lecture & In-Class Activities	15	2	30
Preliminary & Further Study	2	1	2
Laboratory	3	1	3
Assignment (Homework)	4	1	4
Seminar	3	1	3
Report Writing	5	1	5
Final Exam	1	3	3
Preparation for the Final Exam	1	8	8
Mid-Term Exam	1	2	2
Preparation for the Mid-Term Exam	1	6	6
Short Exam	6	0.5	3
Preparation for the Short Exam	6	1	6
TOTAL	48	28	75
Total Workload of the Course Unit			75
Workload (h) / 25			3
ECTS Credits allocated for the Course Unit			3
7. Course administrator's name (mention all, if more than one name)			

Name: Asst. Prof. Abdullah Ahmed Sheikho

Email: Abidallah.shekho@ntu.edu.iq

8. Course Objectives

Course Objectives	Course Objectives Understand Geological Principles: Learn the fundamental principles of geology, including rock formation, mineralogy, and geological time scales. Identify Geological Hazards: Recognize and assess natural hazards such as earthquakes, landslides, and volcanic activity. Analyze Soil and Rock Properties: Study the physical and mechanical properties of soils and rocks and their implications for engineering projects. Evaluate Site Conditions: Develop skills to evaluate geological conditions at construction sites, including site investigation techniques.
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9. Teaching and Learning Strategies

Strategy	Interactive theoretical lectures using the whiteboard and modern presentation tools (Data Show). Solving problems and applied examples with student participation to develop critical thinking and problem-solving skills. Homework, quizzes and reports, supported by e-learning platforms (Google Classroom).
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10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
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	2	Student understands and applies the material	Demonstrates knowledge about the introduction to: Fundamentals of Geology: The Earth zones. Geological processes of internal and external origin. Absolute and relative age of rocks. Geological time table. Tectonic movements of Earth crust. Folding and faulting. Earthquakes. Seismic zoning and micro zoning. Weathering. Geological activities of wind. Eolian deposits. Water erosion. Sheet erosion. Gullies. Geological work of rivers. Alluvial deposits Glaciers. Glacial till, fluvioglacial and limbo glacial deposits. Coastal environment, marine erosion and deposition. Longshore drift. Swamps. Peat depositions. Origin of subsurface water. Aquifers, aquicludes. Ground water, capillary fringe, perched water, confined water. Water aggressiveness. Groundwater regime. Groundwater motion. Darcy's law. Determination of the coefficient of permeability. Inflow to foundation pits, trenches and wells. Geological activities of groundwater: karst, piping, landslides, frost heave. Rock-falls, talus, creep. Man-made geological process. Geology and Geotechnics: Engineering geological and geotechnical investigations. Engineering geology and geotechnics. Geotechnical problems in design. Engineering geological conditions of building site. Geotechnical design requirements of Eurocode. Geotechnical supervision. Field	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
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			exploration: boring, sampling. In situ tests: cone penetration tests, standard penetration test, dynamic propping test, pressure meter test, field vane tests, plate loading test etc. Geophysical methods of investigation. The course includes the study of advanced problems in engineering geology: Aspects of dam geology. Geology and tunneling. Geology and surface excavations. Case studies of failures of civil constructions due to geological factors. Aspects of Environmental Engineering Geology. Practical exercises Engineering applications.		
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11. Course Evaluation

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

Evaluation type	Mark
Quizzes	10
Homework and reports	10
Attendance, participation and class activities	10
Mid-term examination	20
Final examination	50
Total	100

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Bell, F.G. (2007). Engineering Geology, 2nd ed. Elsevier.
Main references (sources)	Waltham, T. Foundations of Engineering Geology. CRC Press.
Recommended books and references (scientific journals, reports...)	Relevant peer-reviewed scientific journals and lecture notes prepared by the instructor.
Electronic References, Websites	Northern Technical University e-learning platforms (ntu.edu.iq) and Google Classroom; Iraqi Virtual Science Library (ivsl.org); open courseware such as NPTEL and MIT OpenCourseWare.

Course Description Form

1. Course Name:					
Mathematics II					
2. Course Code:					
MPE 102					
3. Semester / Year:					
Semester 2 / First Year – Academic Year 2025-2026					
4. Description Preparation Date:					
2/9/2025					
5. Available Attendance Forms:					
In-person attendance (Face to Face) – Language of instruction: English					
6. Number of Credit Hours (Total) / Number of Units (Total)					
Number of units (ECTS): 6 ECTS Weekly hours: 5 hrs (theory 3 + practical 2) Student workload: structured (SSWL) 78 h/sem + unstructured (USSWL) 72 h/sem = 150 h/sem					
7. Course administrator's name (mention all, if more than one name)					
Name: Asst. Prof. Dr. Adnan Abdul Wahab Ismail Email: adnan.ismael@ntu.edu.iq					
8. Course Objectives					
Course Objectives	Course Objectives This course provides students with the fundamentals for the following topics: plane analytic geometry (Circle, parabola, Ellipse, Hyperbola). partial derivatives for Functions of two or more variables. Hyperbolic function. Multiple Integration. Differential equations (1 order 1 degree).				
9. Teaching and Learning Strategies					
Strategy	This course has several components that include studying lectures, tutorial, discussion, homework, and e-learning platforms. The course will be taught in English, and all compulsory assignments have to be submitted within the deadlines to be admitted to the exam.				
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	Identify geometry (Circle, Parabola, Ellipse, Hyperbola) plane analytic	plane analytic geometry	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion

4	16	Identify and understand the partial derivatives for function of two or more Variable. use the partial derivatives to find the maximum and minimum of functions of several variables independent (Lagrange multipliers method). Find the error in the dimension, area and volume and estimate the least amount of material for constructions tanks by using total differentiation for functions of two or more variable.	partial derivative	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
3	12	Identify the hyperbolic functions, their graphs, their function derivatives, their integrals, and their inverse functions	Hyperbolic function	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
4	16	use Double integrals to find areas of more general regions in the plane use polar coordinates to simplify computing a double integral. use Triple integrals can be to find volumes of still more general regions in space Use double Integration to find the area, volume, mass, center of gravity, moment and moment of inertia of the functions	Multiple Integration	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
3	12	Classifying equation differential Understand the formation and solution of ordinary differential equation discuss some methods for solving and approximating solutions of the (1st order 1st degree) differential	Differential Equations	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion

11. Course Evaluation

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

Homework 4	4
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First Term Exam	13
Second Term Exam	13
Final Exam	60
Total	100

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Thomas, G.B., Weir, M.D. & Hass, J. Thomas' Calculus. Pearson.
Main references (sources)	Kreyszig, E. Advanced Engineering Mathematics. Wiley.
Recommended books and references (scientific journals, reports...)	Relevant peer-reviewed scientific journals and lecture notes prepared by the instructor.
Electronic References, Websites	Northern Technical University e-learning platforms (ntu.edu.iq) and Google Classroom; Iraqi Virtual Science Library (ivsl.org); open courseware such as NPTEL and MIT OpenCourseWare.

Course Description Form

1. Course Name:	
Introduction to Water Resources Engineering	
2. Course Code:	
EWRT 106	
3. Semester / Year:	
Semester 2 / First Year – Academic Year 2025-2026	
4. Description Preparation Date:	
2/9/2025	
5. Available Attendance Forms:	
In-person attendance (Face to face)	
6. Number of Credit Hours (Total) / Number of Units (Total)	
Number of units (ECTS): 4 ECTS Weekly hours: 3 hrs (theory 2 + practical 1) Student workload: structured (SSWL) 48 h/sem + unstructured (USSWL) 52 h/sem = 100 h/sem	
7. Course administrator's name (mention all, if more than one name)	
Name: To be assigned by the Head of Department Email: —	
8. Course Objectives	
Course Objectives	Course Objectives Introduce the concept of water resources, their surface and groundwater sources, and their role in sustainable development. Understand the hydrological cycle and the components of the water balance. Identify the different uses of water (domestic, irrigation, industry, hydropower) and estimate water demands. Recognize the main water resources structures (dams, reservoirs, canals, pumping stations) and their functions. Appreciate the status of water resources in Iraq and the challenges of water scarcity and climate change.
9. Teaching and Learning Strategies	
Strategy	Interactive theoretical lectures using the whiteboard and modern presentation tools (Data Show). Solving problems and applied examples with student participation to develop critical thinking and problem-solving skills. Practical sessions in the laboratory/field and writing technical reports on the experiments. Homework, quizzes and reports, supported by e-learning platforms (Google Classroom).

10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Student understands and applies the material	Introduction to water resources engineering	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
2	3	Student understands and applies the material	The hydrological cycle and its components	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
3	3	Student understands and applies the material	The water balance	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
4	3	Student understands and applies the material	Precipitation: measurement and data analysis	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
5	3	Student understands and applies the material	Surface runoff estimation	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
6	3	Student understands and applies the material	Groundwater: basic concepts	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
7	3	Student understands and applies the material	Mid-term examination	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
8	3	Student understands and applies the material	Water demands for different uses	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
9	3	Student understands and applies the material	Irrigation water requirements	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion

10	3	Student understands and applies the material	Dams and reservoirs: types and functions	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
11	3	Student understands and applies the material	Canals and water control structures	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
12	3	Student understands and applies the material	Pumping stations and conveyance systems	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
13	3	Student understands and applies the material	Water quality and its effect on water use	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
14	3	Student understands and applies the material	Water resources in Iraq and the challenge of water scarcity	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
15	3	Student understands and applies the material	General review	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion

11. Course Evaluation

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

Evaluation type	Mark
Quizzes	10
Homework and reports	10
Attendance, participation and class activities	10
Mid-term examination	20
Final examination	50
Total	100

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Mays, L.W. Water Resources Engineering. Wiley.
Main references (sources)	Wurbs, R.A. & James, W.P. Water Resources Engineering. Prentice Hall.

Recommended books and references (scientific journals, reports...)	Relevant peer-reviewed scientific journals and lecture notes prepared by the instructor.
Electronic References, Websites	Northern Technical University e-learning platforms (ntu.edu.iq) and Google Classroom; Iraqi Virtual Science Library (ivsl.org); open courseware such as NPTEL and MIT OpenCourseWare.

Note: No description of this course was included in the original file; its fields were completed according to the course title in the study plan.

Course Description Form

1. Course Name:			
Computer			
2. Course Code:			
NTU 102			
3. Semester / Year:			
Semester 2 / First Year – Academic Year 2025-2026			
4. Description Preparation Date:			
2/9/2025			
5. Available Attendance Forms:			
In-person attendance (Face to Face) – Language of instruction: English			
6. Number of Credit Hours (Total) / Number of Units (Total)			
Number of units (ECTS): 3 ECTS Weekly hours: 3 hrs (theory 1 + practical 2) Student workload: structured (SSWL) 48 h/sem + unstructured (USSWL) 27 h/sem = 75 h/sem			
Workload for Learning & Teaching Activities			
Type of Learning Activity	Activities (# per week)	Duration (h)	Workload (h)
Lecture & In-Class Activities	15	1	15
Laboratory	15	2	30
Assignment (Homework)	1	1	1
Seminar	2	1	2
Web Based Learning	3	1	3
Final Exam	1	3	3
Preparation for the Final Exam	1	10	10
Mid-Term Exam	1	2	2
Preparation for the Mid-Term Exam	1	5	5
Short Exam	2	1	2
Preparation for the Short Exam	2	1	2
TOTAL	44	28	75
Total Workload of the Course Unit			75
Workload (h) / 25			3
ECTS Credits allocated for the Course Unit			3
7. Course administrator's name (mention all, if more than one name)			
Name: Alaa Imad Hamid			

Email: —					
8. Course Objectives					
Course Objectives	Course Objectives Understand Computer Architecture: Gain foundational knowledge of computer architecture, including the CPU, memory, and I/O devices.				
9. Teaching and Learning Strategies					
Strategy	Interactive lectures using modern presentation tools (Data Show). Dialogue, discussion and thought-provoking questions to encourage class participation. Reports, seminars and class activities supported by e-learning platforms.				
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Student understands and applies the material	Demonstrates knowledge of the Introduction to computer, computer component (hardware, software)	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
2	3	Student understands and applies the material	Demonstrates knowledge of the Operating system (windows), Able to install windows (formatting)	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
3,4	3	Student understands and applies the material	Able to use the following items: Start menu, desktop, taskbar , mouse applications, My computer , My documents , drivers , folders , files , cut , copy , paste , shortcut , right click menu, Setting menu , control panel	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
5,6	3	Student understands and applies the material	Able to use Microsoft word 2020	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
7,8,9	3	Student understands and applies the material	Able to use Microsoft excel 2020	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
10,11	3	Student understands and applies the material	Able to use Microsoft power point 2020	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion

12	3	Student understands and applies the material	Able to use Internet, internet explorer, starting , menus of internet explorer	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
13	3	Student understands and applies the material	Able to create and use E-mail : yahoo , Hotmail	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
14,15	3	Student understands and applies the material	Able to utilize Search engines, Able to use google , yahoo , search information	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion

11. Course Evaluation

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

Evaluation type	Mark
Quizzes	10
Homework and reports	10
Attendance, participation and class activities	10
Mid-term examination	20
Final examination	50
Total	100

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Sinha, P.K. & Sinha, P. Computer Fundamentals. BPB Publications.
Main references (sources)	Microsoft Office (Word, Excel, PowerPoint) user guides.
Recommended books and references (scientific journals, reports...)	Relevant peer-reviewed scientific journals and lecture notes prepared by the instructor.
Electronic References, Websites	Northern Technical University e-learning platforms (ntu.edu.iq) and Google Classroom; Iraqi Virtual Science Library (ivsl.org).

Course Description Form

1. Course Name:			
Arabic Language			
2. Course Code:			
NTU 103			
3. Semester / Year:			
Semester 2 / First Year – Academic Year 2025-2026			
4. Description Preparation Date:			
2/9/2025			
5. Available Attendance Forms:			
In-person attendance (Face to Face) – Language of instruction: Arabic			
6. Number of Credit Hours (Total) / Number of Units (Total)			
Number of units (ECTS): 2 ECTS Weekly hours: 2 hrs (theory 2 + practical 0) Student workload: structured (SSWL) 33 h/sem + unstructured (USSWL) 17 h/sem = 50 h/sem			
Workload for Learning & Teaching Activities			
Type of Learning Activity	Activities (# per week)	Duration (h)	Workload (h)
Lecture & In-Class Activities	15	2	30
Assignment (Homework)	2	1	2
Final Exam	1	3	3
Preparation for the Final Exam	1	2	2
Mid-Term Exam	1	3	3
Preparation for the Mid-Term Exam	1	5	5
Short Exam	2	2	2
Preparation for the Short Exam	2	2	2
TOTAL	25	20	49
Total Workload of the Course Unit			49
Workload (h) / 25			1.96
ECTS Credits allocated for the Course Unit			2
7. Course administrator's name (mention all, if more than one name)			
Name: Asst. Prof. Dr. Abdalnaser Kashmoola Email: —			
8. Course Objectives			

Course Objectives	Course Objectives				
	Enable the student to write correct Arabic free of spelling and grammatical errors.				
	Learn the rules of writing the hamza, the tied and open taa, and the long and short alif.				
	Develop students' skills in written expression and in writing official letters and reports.				
Strengthen the student's pride in the Arabic language and the ability to use it in academic and professional life.					
9. Teaching and Learning Strategies					
Strategy	Interactive lectures using modern presentation tools (Data Show).				
	Dialogue, discussion and thought-provoking questions to encourage class participation.				
Reports, seminars and class activities supported by e-learning platforms.					
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Student understands and applies the material	مفهوم الأخطاء اللغوية، قواعد كتابة التاء المربوطة والتاء المفتوحة	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
2	2	Student understands and applies the material	الألف الممدودة والمقصورة، الحروف الشمسية والقمرية	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
3	2	Student understands and applies the material	الطاء والضاد	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
4	2	Student understands and applies the material	كتابة همزة الوصل و القطع، الهمزة المتوسطة، الهمزة المتطرفة	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
5,6	2	Student understands and applies the material	علامات الترقيم , علامات الترقيم والتفريق بينهما	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
7	2	Student understands and applies the material	المفعول به، المفعول المطلق، المفعول لأجله، المفعول فيه	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
8,9,10	2	Student understands and applies the material	العدد، تطبيقات الاخطاء اللغوية الشائعة	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion

11,12	2	Student understands and applies the material	معاني حروف الجر , قاعدة الالف الفارقة, قاعدة النون والتتوين , الجوانب الشكلية للخطاب الاداري	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
,13,14,15	2	Student understands and applies the material	لغة الخطاب الاداري	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion

11. Course Evaluation

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

Evaluation type	Mark
Quizzes	10
Homework and reports	10
Attendance, participation and class activities	10
Mid-term examination	20
Final examination	50
Total	100

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	The approved Arabic Language textbook for non-specialists.
Main references (sources)	Abdul-Salam Harun. Rules of Arabic Spelling (Qawa'id al-Imla').
Recommended books and references (scientific journals, reports...)	Relevant peer-reviewed scientific journals and lecture notes prepared by the instructor.
Electronic References, Websites	Northern Technical University e-learning platforms (ntu.edu.iq) and Google Classroom; Iraqi Virtual Science Library (ivsl.org).

Course Descriptions – Second Year

Course Description Form

1. Course Name:	
Fluid Mechanics	
2. Course Code:	
EWRT 107	
3. Semester / Year:	
Semester 3 / Second Year – Academic Year 2025-2026	
4. Description Preparation Date:	
2/9/2025	
5. Available Attendance Forms:	
In-person attendance (FACE to FACE) – Language of instruction: English	
6. Number of Credit Hours (Total) / Number of Units (Total)	
Number of units (ECTS): 6 ECTS Weekly hours: 5 hrs (theory 2 + practical 3) Student workload: structured (SSWL) 93 h/sem + unstructured (USSWL) 57 h/sem = 150 h/sem	
7. Course administrator's name (mention all, if more than one name)	
Name: Asst. Prof. Dr. Abdalnaser Kashmoola Email: —	
8. Course Objectives	
Course Objectives	Course Objectives On successful completion of this course students will be able to: -Defining the formulas that give the main parameters of fluids (i). -Formulate the main equations that cover the fundamentals of concern fields -applying the formulas and equations to solve different problems in various -fields to give the results that can be used in different sides of engineering (ii). -Correlating the theoretical principles with practical by carrying out laboratory experiments with analysis of results and discussion (iii). Learning Outcomes This course has several components that include lectures, individual assignments, and e-learning platforms. The course will be taught in English and all mandatory assignments have to be submitted within the deadlines be admitted to the exams.
9. Teaching and Learning Strategies	
Strategy	Interactive theoretical lectures using the whiteboard and modern presentation tools (Data Show). Solving problems and applied examples with student participation to develop critical thinking and problem-solving skills.

	Practical sessions in the laboratory/field and writing technical reports on the experiments. Homework, quizzes and reports, supported by e-learning platforms (Google Classroom).
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10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
2	5	Student understands and applies the material	Fluids properties , Fluid statics Pressure in fluid ; Types of pressure; Pressure measuring devices.	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
2	5	Student understands and applies the material	Pressure force on, submerged plane surface; Pressure, force on submerged	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
2	5	Student understands and applies the material	curved surface . Fluid Kinematics: lectures, Flow patterns; individual Continuity equation, and its applications and e-learn platforms	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
2	5	Student understands and applies the material	curved surface. Fluid Kinematics:Flow patterns Continuity equation, and its applications and	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
3	5	Student understands and applies the material	Bernoulli's equation, and its applications.	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
2	5	Student understands and applies the material	Momentum equation and its applications.	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
3	5	Student understands and applies the material	Flow of real fluid pipe, friction loss types of problems minor losses	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
1	5	Student understands and applies the material	Pipes in series and parallel	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports etc	
Quizzes	11.67 %
1st monthly exam	11.67 %
2nd monthly exam	11.67 %
Fluid lab. Term Exam	5%
Fluid lab. Reports	10%
Fluid lab. Final Exam	10%
12. Learning and Teaching Resources	
Main references (sources)	Esposito, A., 1998, Fluid Mechanics with applications, Prentice Hall, Inc.
Recommended books and references (scientific journals, reports...)	1.White, F. M., 1994, Fluid Mechanics, 3rd ed . McGraw Hill, Inc. 2. Cengel Y. and Cimbala J., 2014, Fluid Mechanics Fundamentals and Applications, 4th edition, McGraw Hill.

Course Description Form

1. Course Name:			
Engineering Surveying			
2. Course Code:			
EWRT 108			
3. Semester / Year:			
Semester 3 / Second Year – Academic Year 2025-2026			
4. Description Preparation Date:			
2/9/2025			
5. Available Attendance Forms:			
In-person attendance (Face to Face) – Language of instruction: English			
6. Number of Credit Hours (Total) / Number of Units (Total)			
Number of units (ECTS): 5 ECTS Weekly hours: 3 hrs (theory 3 + practical 0) Student workload: structured (SSWL) 93 h/sem + unstructured (USSWL) 32 h/sem = 125 h/sem			
Workload for Learning & Teaching Activities			
Type of Learning Activity	Activities (# per week)	Duration (h)	Workload (h)
Lecture & In-Class Activities	15	5	75
Land Surveying	2	1	2
Group Work	1	1	1
Laboratory	8	1	8
Assignment (Homework)	4	1	4
Project Work	1	1	1
Seminar	3	1	1
Report Writing	8	1	8
Final Exam	1	3	3
Preparation for the Final Exam	1	10	10
Mid-Term Exam	1	2	2
Preparation for the Mid-Term Exam	1	5	5
Short Exam	4	0.5	2
Preparation for the Short Exam	4	1	4
TOTAL	54	33	126
Total Workload of the Course Unit			126
Workload (h) / 25			5.0

ECTS Credits allocated for the Course Unit					5
7. Course administrator's name (mention all, if more than one name)					
Name: Asst. Prof. Dr. Adnan Abdul Wahab Ismail					
Email: adnan.ismael@ntu.edu.iq					
8. Course Objectives					
Course Objectives	Course Objectives Introducing the fundamentals, purposes, & the required calculations of the plane surveying to the student as well as qualifying him to use the different kinds of surveying instruments in designing & executing the projects of civil engineering.				
9. Teaching and Learning Strategies					
Strategy	Interactive theoretical lectures using the whiteboard and modern presentation tools (Data Show). Solving problems and applied examples with student participation to develop critical thinking and problem-solving skills. Homework, quizzes and reports, supported by e-learning platforms (Google Classroom).				
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Student understands and applies the material	Draws Contour lines: Method of drawing and construction.	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
2,3	3	Student understands and applies the material	Calculates Areas and volumes: Volume computation from cross-section, Volume from topographic maps and grid net, Volume computation from contour maps.	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
4	3	Student understands and applies the material	Demonstrates knowledge about Theodolites, Principle of construction	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
5	3	Student understands and applies the material	Correctly implement Measuring Horizontal angles Correctly implement Measuring angles in vertical plane	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
6	3	Student understands and applies the material	Recognition of laboratory Directions, Whole circle bearing, Reduce Bearing	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion

7	3	Student understands and applies the material	Demonstrates knowledge about Traverse Surveys, Bearings, forward & Back bearing	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
8	3	Student understands and applies the material	Correctly implement Close circle traverse, coordinates calculations Correctly execute Close connected traverse , coordinates calculations	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
9	3	Student understands and applies the material	Monitors and conducts Tachometry, stadia tachometry, Inclined sights	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
10	3	Student understands and applies the material	Carries out Electromagnetic distance measurement (EDM), basic concept, systems	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
11	3	Student understands and applies the material	Demonstrates knowledge about Total station, Field Techniques, point location, missing line measurements	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
12	3	Student understands and applies the material	Demonstrates knowledge about resection, azimuth, elevation, layout positions and area computation	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
13,14	3	Student understands and applies the material	Demonstrates knowledge about Motorized Total stations. Correctly implement and execute automatic, remote control, computerized	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
15	3	Student understands and applies the material	Correctly draw horizontal curves kinds. Correctly execute computations	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion

11. Course Evaluation

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

Evaluation type	Mark
Quizzes	10
Homework and reports	10
Attendance, participation and class activities	10
Mid-term examination	20
Final examination	50

Total	100
12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Ghilani, C.D. & Wolf, P.R. Elementary Surveying: An Introduction to Geomatics. Pearson.
Main references (sources)	Schofield, W. & Breach, M. Engineering Surveying. Elsevier.
Recommended books and references (scientific journals, reports...)	Relevant peer-reviewed scientific journals and lecture notes prepared by the instructor.
Electronic References, Websites	Northern Technical University e-learning platforms (ntu.edu.iq) and Google Classroom; Iraqi Virtual Science Library (ivsl.org); open courseware such as NPTEL and MIT OpenCourseWare.

Course Description Form

1. Course Name:	
Water Supply Networks	
2. Course Code:	
EWRT 109	
3. Semester / Year:	
Semester 3 / Second Year – Academic Year 2025-2026	
4. Description Preparation Date:	
2/9/2025	
5. Available Attendance Forms:	
In-person attendance (FACE to FACE) – Language of instruction: English	
6. Number of Credit Hours (Total) / Number of Units (Total)	
Number of units (ECTS): 5 ECTS Weekly hours: 3 hrs (theory 3 + practical 0) Student workload: structured (SSWL) 45 h/sem + unstructured (USSWL) 80 h/sem = 125 h/sem	
7. Course administrator's name (mention all, if more than one name)	
Name: Asst. Prof. Abdullah Ahmed Sheikho Email: Abidallah.shekho@ntu.edu.iq	
8. Course Objectives	
Course Objectives	Course Objectives The course aim to describe the main components of water supply network system including water pipes network, pump station, and service storage tanks, also it describes all parameters that correlate with network such as valves, pipe materials, loads exerted on pipes. The course covers the methods that used to analysis and design of the main components of water supply network system, and learns the necessary principles of network maintenance and rehabilitation. Learning Outcomes CLO-1: Recognizing the main parameters that must be available in the water supply network system to provide the required purpose of it (i). CLO-2: Understanding the major principles that can be used to simulate the water network in computer software (i). CLO-3: Understanding the major principles that can be used to solve the likely problems that may be occur in the network (ii). CLO-4: Applying the fundamentals of fluid mechanics in the analysis and design of the main components of the system (ii). CLO-5: Learning skills in the design and analysis of water network using computer software (i) and (iv)
9. Teaching and Learning Strategies	

Strategy	Interactive theoretical lectures using the whiteboard and modern presentation tools (Data Show). Solving problems and applied examples with student participation to develop critical thinking and problem-solving skills. Homework, quizzes and reports, supported by e-learning platforms (Google Classroom).
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10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Student understands and applies the material	Hazen Williams equation and its applications, equivalent pipe principle.	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
2	3	Student understands and applies the material	. Water distribution system: Basic types of demand, peaking factors, demand estimation, skeletonization, demand allocation.	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
3	3	Student understands and applies the material	Distribution methods, configuration of distribution system.	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
4	3	Student understands and applies the material	Design and analysis of water networks, sequences of analysis and design steps, design consideration.	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
5	3	Student understands and applies the material	Examples on analysis and design of branched network.	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
6	3	Student understands and applies the material	Hardy-Cross method, example on looped network analysis.	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
7	3	Student understands and applies the material	Service storage tanks, types of tanks, storage volume components, methods of equalization volume computation	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
8	3	Student understands and applies the material	Examples on equalization volume computation, fire storage.	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
9	3	Student understands and applies the material	Emergency storage, tank location, quality of water tank, tank maintenance.	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion

10	3	Student understands and applies the material	Pump stations, types of pumps, total dynamic head, system head curve, pump characteristics curves, selection of pumping units.	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
11	3	Student understands and applies the material	Flow range of centrifugal pumps, pumps connection in series and parallel, examples.	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
12	3	Student understands and applies the material	Cavitation phenomenon and net positive suction head, affinity laws, specific speed, examples.	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
13	3	Student understands and applies the material	Computer software applications.	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
14	3	Student understands and applies the material	Pipe material selection, advantages and disadvantages of different types of pipes, types of valves.	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
15	3	Student understands and applies the material	Loads on buried pipes, Marston equation, bedding pipe selection, truck load, internal pressure, thrust forces, examples .	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion

11. Course Evaluation

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

Evaluation type	Mark
Quizzes	10
Homework and reports	10
Attendance, participation and class activities	10
Mid-term examination	20
Final examination	50
Total	100

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Viessman, W. & Hammer, M.J. Water Supply and Pollution Control. Pearson.
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Main references (sources)	Walski, T.M. et al. Advanced Water Distribution Modeling and Management. Bentley Institute Press.
Recommended books and references (scientific journals, reports...)	Relevant peer-reviewed scientific journals and lecture notes prepared by the instructor.
Electronic References, Websites	Northern Technical University e-learning platforms (ntu.edu.iq) and Google Classroom; Iraqi Virtual Science Library (ivsl.org); open courseware such as NPTEL and MIT OpenCourseWare.

Course Description Form

1. Course Name:			
Building Construction			
2. Course Code:			
EWRT 110			
3. Semester / Year:			
Semester 3 / Second Year – Academic Year 2025-2026			
4. Description Preparation Date:			
2/9/2025			
5. Available Attendance Forms:			
In-person attendance (FACE to FACE) – Language of instruction: English			
6. Number of Credit Hours (Total) / Number of Units (Total)			
Number of units (ECTS): 4 ECTS Weekly hours: 4 hrs (theory 3 + practical 1) Student workload: structured (SSWL) 45 h/sem + unstructured (USSWL) 55 h/sem = 100 h/sem			
Workload for Learning & Teaching Activities			
Type of Learning Activity	Activities (# per week)	Duration (h)	Workload (h)
Lecture & In-Class Activities	15	3	45
Preliminary & Further Study	2	1	2
Assignment (Homework)	8	1	8
Project Work	2	1	2
Seminar	3	1	3
Report Writing	4	1	4
Final Exam	1	3	3
Preparation for the Final Exam	1	12	12
Mid-Term Exam	1	2	2
Preparation for the Mid-Term Exam	1	8	8
Short Exam	5	1	5
Preparation for the Short Exam	5	1	5
TOTAL	48	35	99
Total Workload of the Course Unit			99
Workload (h) / 25			3.96
ECTS Credits allocated for the Course Unit			4
7. Course administrator's name (mention all, if more than one name)			

Name: Asst. Prof. Dr. Mohammad Akram Saadi Ayoub Al-Dabbagh
Email: mohamed.akram@ntu.edu.iq

8. Course Objectives

Course Objectives	Course Objectives In this subject the student will learn; Soil investigation and soil bearing capacity , foundation types , building of walls by many masonry types (brick , stone , block , ...) , forms types and scaffoldings , beams and columns , roofs and floor constructions , thermal and acoustical isolations, damp proofing , finishing works
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9. Teaching and Learning Strategies

Strategy	Interactive theoretical lectures using the whiteboard and modern presentation tools (Data Show). Solving problems and applied examples with student participation to develop critical thinking and problem-solving skills. Practical sessions in the laboratory/field and writing technical reports on the experiments. Homework, quizzes and reports, supported by e-learning platforms (Google Classroom).
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10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	Student understands and applies the material	Carries out Site investigation, phases of site and soil investigation.	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
2	4	Student understands and applies the material	Conducts the Standard tests concerning Methods of soil investigation, open-pit, boring and auger, standard and cone test methods.	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
3	4	Student understands and applies the material	Computes Bearing capacity. Uses correctly Calculation and determination in filed and laboratory. Monitors and conducts Increasing of bearing capacity and its relation with foundation design.	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
4	4	Student understands and applies the material	Conducts the Standard tests concerning Excavation and filling work, cut and fill, shoring system, angle of repose, failure of embankment, layers of filling.	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion

5,6	4	Student understands and applies the material	Able to identify and correctly implement Types of foundations, excavation, shoring system, reinforcing and concrete casting, drying of site work.	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
7	4	Student understands and applies the material	Able to identify Pile foundations, bored and driven piles, sheet piles, capping of piles.	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
8	4	Student understands and applies the material	Recognition of laboratory about Masonry stone work. Able to identify stone building types and specifications. Correctly implement building under ground level, above ground level. Correctly draw preparation of stone building.	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
9	4	Student understands and applies the material	Able to identify Brick and block works. Correctly implement British and Flemish arrangements. Carries out procedure to construct walls, connections between old and new walls.	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
10	4	Student understands and applies the material	Demonstrates knowledge about Hollow cavity walls, their specifications and components, reinforced walls.	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
11	4	Student understands and applies the material	Demonstrates knowledge and able to identify Thermal insulation materials, specification and types, thermal transmittance factor, resistance concept.	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
12	4	Student understands and applies the material	Recognition of laboratory and uses correctly Acoustical insulation and fire resistance for building	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion

13	4	Student understands and applies the material	Recognition of laboratory about Concrete Forms, timber forms (specification and components), bracing for roofs and columns.	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
14,15	4	Student understands and applies the material	Recognition of laboratory about Slip and travel forms, components and operation.	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion

11. Course Evaluation

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

Evaluation type	Mark
Quizzes	10
Homework and reports	10
Attendance, participation and class activities	10
Mid-term examination	20
Final examination	50
Total	100

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Chudley, R. & Greeno, R. Building Construction Handbook. Routledge.
Main references (sources)	Iraqi technical specifications for civil works.
Recommended books and references (scientific journals, reports...)	Relevant peer-reviewed scientific journals and lecture notes prepared by the instructor.
Electronic References, Websites	Northern Technical University e-learning platforms (ntu.edu.iq) and Google Classroom; Iraqi Virtual Science Library (ivsl.org); open courseware such as NPTEL and MIT OpenCourseWare.

Course Description Form

1. Course Name:			
Solid Waste Engineering			
2. Course Code:			
EWRT 111			
3. Semester / Year:			
Semester 3 / Second Year – Academic Year 2025-2026			
4. Description Preparation Date:			
2/9/2025			
5. Available Attendance Forms:			
In-person attendance (FACE to FACE) – Language of instruction: English			
6. Number of Credit Hours (Total) / Number of Units (Total)			
Number of units (ECTS): 5 ECTS Weekly hours: 5 hrs (theory 3 + practical 2) Student workload: structured (SSWL) 60 h/sem + unstructured (USSWL) 65 h/sem = 125 h/sem			
Structured SWL (h/sem)	60	Structured SWL (h/w)	5.2
Unstructured SWL (h/sem)	65	Unstructured SWL (h/w)	4.8
Total SWL (h/sem)	125		
7. Course administrator's name (mention all, if more than one name)			
Name: Asst. Prof. Dr. Maha Mohamed Taha Hassan Email: maha.mohammed@ntu.edu.iq			
8. Course Objectives			
Course Objectives	Course Objectives The course would cover-general introduction including definition of municipal solid waste; legal issues and requirements for solid waste management; sampling and characterization of solid waste; analysis of solid waste constituents; health and environmental issues related to solid waste management; steps in solid waste management including solid waste reduction at source, collection techniques, materials and resource recovery/recycling, transport, optimization of solid waste transport, treatment and disposal techniques (composting, incineration, refuse derived fuels, landfilling). Learning Outcomes CLO-1: Explain municipal solid waste management systems with respect to its physical properties, and associated critical considerations. (i) CLO-2: Outline sources, types and composition of solid waste with methods of handling, sampling and storage of solid waste. (i)		

	CLO-3: Select the appropriate method for solid waste collection, transportation, redistribution and disposal. (i) CLO-4: Describe methods of disposal of hazardous solid waste. (i) CLO-5: Design the collection systems of solid waste of a town. (ii) CLO-6: Design treatment of municipal solid waste and landfill. (ii) CLO-7: Design a composting facility. (ii) CLO-8: All student make a project in design of solid waste collection system. (vii)
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9. Teaching and Learning Strategies

Strategy	This course has several components that include lectures, assignments, exams. Exercises design the solid waste collection for each student. The course will be taught in Arabic, and all mandatory assignments have to be submitted within the deadlines to be admitted to the exams.
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10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	5	Student understands and applies the material	Evolution of Solid-Waste Management	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
2	5	Student understands and applies the material	Legislative Trends and Impacts	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
3	5	Student understands and applies the material	Sources, Types, and Composition of Municipal Solid Wastes	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
4	5	Student understands and applies the material	Application examples about composition of solid waste	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
5	5	Student understands and applies the material	Physical Properties of Municipal Solid Waste	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion

6	5	Student understands and applies the material	Chemical Properties of Municipal Solid Waste	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
7	5	Student understands and applies the material	Biological Properties of Municipal Solid Waste	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
8	5	Student understands and applies the material	Sources, Types, and Properties of Hazardous Wastes Found in Municipal Solid Waste	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
9	5	Student understands and applies the material	Biological Properties of Municipal Solid Waste	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
10	5	Student understands and applies the material	Sources, Types, and Properties of Hazardous Wastes Found in Municipal Solid Waste	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
11	5	Student understands and applies the material	Collection of Solid Waste	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
12	5	Student understands and applies the material	Mid-Term Exam - Time-cost trade-off.	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
13,14,15	5	Student understands and applies the material	Transfer and Transport Separation and Processing and Transformation of Solid Waste Disposal of Solid Wastes and Residual Matter	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion

11. Course Evaluation

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

		Time/Number	Weight (Marks)	Week Due	Relevant Learning outcome
Formative assesment	quizzes	5	20%	5, 8, 10, 14, and 15	1 (CLO-1, CLO - 2), 2 (CLO-2), 3 (CLO-2, CLO-3), 4(All), 5(All)
Formative assesment	Assignments	5	10%	6, 9, 10, 14, and 15	1 (CLO-1, CLO - 2), 2 (CLO-2), 3 (CLO-4, CLO-5), 4(All), 5(All)
Formative assesment	Projects / Lab	1	10%	8, 9, 10, 11, 12, 13,14,15	(CLO-5 and CLO-8)
Formative assesment	report	0	0%		
Summative assessment	Midterm Exam	2HR	10%	7	CLO-1, CLO-2, CLO-3, CLO-4 CLO-5)
Summative assessment	Final exam	3HR	50%	16	All
Total assessment				100%(100 marks)	

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Tchobanoglous, G., Theisen, H. & Vigil, S. (1993). Integrated Solid Waste Management. McGraw-Hill.
Main references (sources)	Vesilind, P.A., Worrell, W. & Reinhart, D. Solid Waste Engineering. Cengage.
Recommended books and references (scientific journals, reports...)	Relevant peer-reviewed scientific journals and lecture notes prepared by the instructor.
Electronic References, Websites	Northern Technical University e-learning platforms (ntu.edu.iq) and Google Classroom; Iraqi Virtual Science Library (ivsl.org); open courseware such as NPTEL and MIT OpenCourseWare.

Course Description Form

1. Course Name:			
Diploma Project			
2. Course Code:			
EWRT 112			
3. Semester / Year:			
Semester 3 / Second Year – Academic Year 2025-2026			
4. Description Preparation Date:			
2/9/2025			
5. Available Attendance Forms:			
In-person attendance (FACE to FACE) – Language of instruction: English			
6. Number of Credit Hours (Total) / Number of Units (Total)			
Number of units (ECTS): 3 ECTS Weekly hours: 1 hrs (theory 1 + practical 0) Student workload: structured (SSWL) 45 h/sem + unstructured (USSWL) 30 h/sem = 75 h/sem			
Workload for Learning & Teaching Activities			
Type of Learning Activity	Activities (# per week)	Duration (h)	Workload (h)
Project Work	1	10	10
Seminar	1	5	5
Technical Visit	14	1	14
Practice at a workplace	14	2	28
Thesis Work	1	5	5
Report Writing	1	1	1
TOTAL	32	24	63
Total Workload of the Course Unit			63
Workload (h) / 27			2.3
ECTS Credits allocated for the Course Unit			2
7. Course administrator's name (mention all, if more than one name)			
Name: Asst. Prof. Dr. Abdalnaser Kashmoola Email: —			
8. Course Objectives			
Course Objectives	Course Objectives Show deep understanding and application of key concepts learned throughout the diploma program		

9. Teaching and Learning Strategies

Strategy	Direct supervision and weekly follow-up of the project teams. Project-based learning addressing real engineering problems. Training students in literature search, technical report writing, presentation and discussion.
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10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	1	Apply acquired knowledge	Selecting the project topic and forming work teams	Weekly supervision and follow-up	Progress monitoring
2	1	Apply acquired knowledge	Literature review of previous studies	Weekly supervision and follow-up	Progress monitoring
3	1	Apply acquired knowledge	Defining project objectives and methodology	Weekly supervision and follow-up	Progress monitoring
4	1	Apply acquired knowledge	Data and information collection	Weekly supervision and follow-up	Progress monitoring
5	1	Apply acquired knowledge	Data and information collection (continued)	Weekly supervision and follow-up	Progress monitoring
6	1	Apply acquired knowledge	Analysis and preliminary calculations	Weekly supervision and follow-up	Progress monitoring
7	1	Apply acquired knowledge	First progress presentation (seminar)	Weekly supervision and follow-up	Progress monitoring
8	1	Apply acquired knowledge	Detailed design and calculations	Weekly supervision and follow-up	Progress monitoring
9	1	Apply acquired knowledge	Detailed design and calculations (continued)	Weekly supervision and follow-up	Progress monitoring
10	1	Apply acquired knowledge	Preparing drawings	Weekly supervision and follow-up	Progress monitoring
11	1	Apply acquired knowledge	Discussion of results	Weekly supervision and follow-up	Progress monitoring
12	1	Apply acquired knowledge	Writing the project report	Weekly supervision and follow-up	Progress monitoring
13	1	Apply acquired knowledge	Reviewing the report with the supervisor	Weekly supervision and follow-up	Progress monitoring

14	1	Apply acquired knowledge	Preparing the presentation	Weekly supervision and follow-up	Progress monitoring
15	1	Apply acquired knowledge	Final defence before the examination committee	Weekly supervision and follow-up	Progress monitoring

11. Course Evaluation

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

Evaluation type	Mark
Weekly follow-up and progress	20
Seminar / progress presentation	10
Project report	20
Final defence before the committee	50
Total	100

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Scientific references specific to each project topic, as directed by the supervisor.
Main references (sources)	The approved college guide for writing graduation projects.
Recommended books and references (scientific journals, reports...)	Relevant peer-reviewed scientific journals and lecture notes prepared by the instructor.
Electronic References, Websites	Northern Technical University e-learning platforms (ntu.edu.iq) and Google Classroom; Iraqi Virtual Science Library (ivsl.org); open courseware such as NPTEL and MIT OpenCourseWare.

Course Description Form

1. Course Name:			
Crimes of Baath Party			
2. Course Code:			
NTU 200			
3. Semester / Year:			
Semester 3 / Second Year – Academic Year 2025-2026			
4. Description Preparation Date:			
2/9/2025			
5. Available Attendance Forms:			
In-person attendance (Face to Face) – Language of instruction: Arabic			
6. Number of Credit Hours (Total) / Number of Units (Total)			
Number of units (ECTS): 2 ECTS Weekly hours: 5 hrs (theory 2 + practical 3) Student workload: structured (SSWL) 33 h/sem + unstructured (USSWL) 17 h/sem = 50 h/sem			
Workload for Learning & Teaching Activities			
Type of Learning Activity	Activities (# per week)	Duration (h)	Workload (h)
Lecture & In-Class Activities	15	2	30
Assignment (Homework)	4	1	4
Seminar	2	1	2
Final Exam	1	3	3
Preparation for the Final Exam	1	5	5
Mid-Term Exam	1	2	2
Preparation for the Mid-Term Exam	1	4	4
Short Exam	6	0.5	3
Preparation for the Short Exam	6	0.5	3
TOTAL	37	19	56
Total Workload of the Course Unit			56
Workload (h) / 25			2.24
ECTS Credits allocated for the Course Unit			2
7. Course administrator's name (mention all, if more than one name)			
Name: Lect. Ahmed Azhar Thanoun Email: ahmedalnamey@ntu.edu.iq			
8. Course Objectives			

Course Objectives	Course Objectives Introduce the crimes of the Baath regime in Iraq according to the law of the Iraqi Supreme Criminal Court. Identify the types of crimes committed (genocide, crimes against humanity, war crimes) and their effects. Understand the psychological, social and environmental effects of these crimes on Iraqi society. Consolidate the values of justice, tolerance and human rights and the rejection of tyranny.
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9. Teaching and Learning Strategies

Strategy	Interactive lectures using modern presentation tools (Data Show). Dialogue, discussion and thought-provoking questions to encourage class participation. Reports, seminars and class activities supported by e-learning platforms.
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10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1,2,3,4	5	Student understands and applies the material	جرائم نظام البعث وفق قانون المحكمة الجنائية العراقية العام ٢٠٠٥م	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
5,6,7,8	5	Student understands and applies the material	الجرائم النفسية والاجتماعية وآثارها، وأبرز انتهاكات النظام البعثي في العراق	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
9,10,11,12	5	Student understands and applies the material	الجرائم البيئية لنظام البعث في العراق	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
13,14,15	5	Student understands and applies the material	جرائم المقابر الجماعية	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion

11. Course Evaluation

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

Evaluation type	Mark
Quizzes	10
Homework and reports	10
Attendance, participation and class activities	10
Mid-term examination	20

Final examination	50
Total	100
12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	The approved textbook for Crimes of the Baath Regime in Iraq – Ministry of Higher Education and Scientific Research.
Main references (sources)	Law of the Iraqi Supreme Criminal Court No. 10 of 2005.
Recommended books and references (scientific journals, reports...)	Relevant peer-reviewed scientific journals and lecture notes prepared by the instructor.
Electronic References, Websites	Northern Technical University e-learning platforms (ntu.edu.iq) and Google Classroom; Iraqi Virtual Science Library (ivsl.org).

Course Description Form

1. Course Name:	
Engineering Hydrology	
2. Course Code:	
EWRT 113	
3. Semester / Year:	
Semester 4 / Second Year – Academic Year 2025-2026	
4. Description Preparation Date:	
2/9/2025	
5. Available Attendance Forms:	
In-person attendance (FACE to FACE) – Language of instruction: English	
6. Number of Credit Hours (Total) / Number of Units (Total)	
Number of units (ECTS): 6 ECTS Weekly hours: 5 hrs (theory 5 + practical 0) Student workload: structured (SSWL) 78 h/sem + unstructured (USSWL) 72 h/sem = 150 h/sem	
7. Course administrator's name (mention all, if more than one name)	
Name: Asst. Prof. Abdullah Ahmed Sheikho Email: Abidallah.shekho@ntu.edu.iq	
8. Course Objectives	
Course Objectives	Course Objectives The aim of this course is to introduce the students to the area of hydrological processes and practices including introduction to the Hydrology. The course will cover discussion of the basic physical principles of the water cycle, different climate factors and components (evaporation, condensation, precipitation, runoff, stream flow). At the end of the course the students will have a working knowledge for estimating Precipitation in different methods as well as Abstraction from Precipitation, Stream flow Measurement, Run-Off, Hydrograph, and Flood Routing 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 Learning Outcomes CLO-1: Recognize the water issues and natural phenomena of different hydrologic process (i) CLO-2: Apply the basic engineering concepts to solve issues associated with hydrologic process (i) CLO-3: Organizing the needed solution, tabulation and calculation for the hydrological problems(i)

	CLO-4: Deriving standard hydrological relationship Using several methods (i). CLO-5: Report the data obtained from the site visits that will be organized during the course (iv) CLO-6: Manage risk and uncertainty for flood measurement (vii)
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9. Teaching and Learning Strategies

Strategy	Interactive theoretical lectures using the whiteboard and modern presentation tools (Data Show). Solving problems and applied examples with student participation to develop critical thinking and problem-solving skills. Homework, quizzes and reports, supported by e-learning platforms (Google Classroom).
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10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	5	Student understands and applies the material	Introduction, objectives, definition of hydrology, branch of Hydrology, hydrological cycle, Hydrological Budget Equation, Engineering Hydrology Application Typical Failure Factors for Hydraulic Installations, Source of Data.	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
2	5	Student understands and applies the material	Climate Factors, Temperature, Solar Radiation, Evaporation, Humidity, Vapor Pressure, Wind.	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
3	5	Student understands and applies the material	Precipitation, Forms of Precipitation, Measurement of precipitation, Types of rain gauge	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
4	5	Student understands and applies the material	Errors in rainfall measurement, Precipitation Gage Network, adequacy of rain measurement stations, Preparation of data, Methods for calculating missing information, Test for Consistency of Records.	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion

5	5	Student understands and applies the material	Average Precipitation over Area, Accumulated Rainfall, Hyetograph, Rainfall Intensity, Probable Maximum Precipitation, Point Rainfall, Depth- area-duration –Relationship, Depth-Area-Duration, Intensity –Duration – Return period relation.	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
6	5	Student understands and applies the material	Abstraction from Precipitation, Losses from precipitation, Evaporation, Evaporimeter, Types of evaporation meters, Class A Evaporation Pan, Pan Coefficient.	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
7	5	Student understands and applies the material	Evaporation Measurement Stations, Empirical Evaporation Equations, Analytical methods for estimating evaporation, Types of evaporation meters, reducing evaporation from tanks	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
8	5	Student understands and applies the material	Evapotranspiration, Potential Evapotranspiration, vapotranspiration Equations, Penman Equation, Blaney – Criddle formula, Evapotranspiration Equations	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
9	5	Student understands and applies the material	Infiltration, Measurement of Infiltration, Infiltration Capacity, Infiltration Capacity Values, Infiltration Indices.	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion

10	5	Student understands and applies the material	Stream flow measurement, Water stage, time curve-Stage , Stream measurement, Measurement of velocity, Calibration, Equalization of the current meter device, steps for measuring discharge by speed- area method.	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
11	5	Student understands and applies the material	chemical methods for measuring discharge, indirect method and classified into two types: 1- Flow measurement facilities 2- Slope- Area method, calibration curve in case of unsteady flow.	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
12	5	Student understands and applies the material	Run – off, Factors affecting the volume of runoff, Direct Runoff, Base Flow, annual runoff volume, Empirical Equation, Rational method, Unit hydrograph, CN-SCS method, Flow-Duration Curve, Flow–Mass Curve, Calculation of Maintainable Demand	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
13	5	Student understands and applies the material	Hydrograph, Surface Runoff, Inter Flow, Base Flow, Hydrograph component, Factors affecting flood hydrograph, Direct Runoff.	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
14	5	Student understands and applies the material	Base Flow, Base Flow Separation, Effective Rain, Unit Hydrograph, Unit Hydrograph Assumptions, Unit Hydrograph Derivation, Unit Hydrograph for Different Duration, S - Curve Method , Uses and limitations of standard hydrograph.	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion

15	5	Student understands and applies the material	Flood Routing, Hydrologic Storage Routing, Hydrologic Channel Routing.	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
16	5	Student understands and applies the material	Preparatory week before the final Exam	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion

11. Course Evaluation

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

		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	24% (24)	4,8,11,13	CLO-1,3, CLO-2,3, CLO-4,5, CLO-6
Formative assessment	Assignment	5	16% (16)	4,6,10,12,14	CLO-1,3, CLO-2,3, CLO-4,5, CLO-6 , CLO-7,8
Formative assessment	Projects / Lab.	0	0% (0)		
Formative assessment	Report	0	0% (0)		
Formative assessment	Midterm Exam	2hrs	10% (10)	14	CLO-1, CLO -2 CLO-3,CLO4,CLO5,CLO6
Summative assessment	Final Exam	3hrs	50% (50)	16	All
			100% (100 Marks)		

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Chow, V.T., Maidment, D.R. & Mays, L.W. (1988). Applied Hydrology. McGraw-Hill.
Main references (sources)	Subramanya, K. Engineering Hydrology. McGraw-Hill.
Recommended books and references (scientific journals, reports...)	Relevant peer-reviewed scientific journals and lecture notes prepared by the instructor.
Electronic References, Websites	Northern Technical University e-learning platforms (ntu.edu.iq) and Google Classroom; Iraqi Virtual Science Library (ivsl.org); open courseware such as NPTEL and MIT OpenCourseWare.

Course Description Form

1. Course Name:			
Strength of Materials			
2. Course Code:			
EWRT 114			
3. Semester / Year:			
Semester 4 / Second Year – Academic Year 2025-2026			
4. Description Preparation Date:			
2/9/2025			
5. Available Attendance Forms:			
In-person attendance (FACE to FACE) – Language of instruction: English			
6. Number of Credit Hours (Total) / Number of Units (Total)			
Number of units (ECTS): 4 ECTS Weekly hours: 3 hrs (theory 2 + practical 1) Student workload: structured (SSWL) 48 h/sem + unstructured (USSWL) 52 h/sem = 100 h/sem			
Student Workload (SWL)			
Structured SWL (h/sem)	48	Structured SWL (h/w)	4.2
Unstructured SWL (h/sem)	52	Unstructured SWL (h/w)	4.1
Total SWL (h/sem)			100
7. Course administrator's name (mention all, if more than one name)			
Name: Asst. Prof. Dr. Mohammad Akram Saadi Ayoub Al-Dabbagh Email: mohamed.akram@ntu.edu.iq			
8. Course Objectives			
Course Objectives	Course Objectives This course is a study of the effect of external loads on structural elements and the behavior of the elements under these loads. Determination of different types of stresses, strains and the relation between them, calculation of stresses in thin-walled pressure vessels, drawing shear and bending-moment diagrams of beams, calculation of bending and shear stresses in beams, and calculating deflections in beams using double integration method are explained in details. The course aims to expand the student's understanding of the structural elements behavior under different loads- that is essential to design and evaluate any structural member. Learning Outcomes CLO-1: Explain the different types of stresses, the relation between them and Understanding how to calculate them (i).		

	CLO-2: Recognize the relation between stress and strain and explain how to calculate them (i). CLO-3: Apply fundamental mechanics to evaluate the suitable structural element dimensions that can be applied without exceeding the stress and strain limits of member (ii). CLO-4: Demonstrate an understanding of the assumptions and limitations of the theories used in mechanics of materials to draw the shear and moment diagrams for beams subjected to various loads (i) CLO-5: Find the maximum shear value and maximum moment value for beams subjected to various loads (i) CLO-6: Apply the theories of mechanics of materials to determine the bending and shear stresses for beams subjected to various loads (i) CLO-7: Formulate deflection equations for beams subjected to various loads (i). CLO-8: Demonstrate an understanding of theories of deflection to find deflection values for beams subjected to various loads (ii)
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9. Teaching and Learning Strategies

Strategy	Interactive theoretical lectures using the whiteboard and modern presentation tools (Data Show). Solving problems and applied examples with student participation to develop critical thinking and problem-solving skills. Practical sessions in the laboratory/field and writing technical reports on the experiments. Homework, quizzes and reports, supported by e-learning platforms (Google Classroom).
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10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Student understands and applies the material	Introduction to Strength of Materials	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
2	3	Student understands and applies the material	Normal Stress	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
3	3	Student understands and applies the material	Shear Stress, Bearing Stress	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion

4	3	Student understands and applies the material	Thin Walled Cylinders (Pressure Vessels) + quiz	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
5	3	Student understands and applies the material	Simple Strain , Stress-Strain Diagram, Hooke's Law	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
6	3	Student understands and applies the material	Statically Indeterminate Problems	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
7	3	Student understands and applies the material	Statically Indeterminate Problems	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
8	3	Student understands and applies the material	Shear and Moment in Beams (Introduction, Supports and Load) + quiz	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
9	3	Student understands and applies the material	Area Method for Drawing Shear and Moment Diagram	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
10	3	Student understands and applies the material	Area Method for Drawing Shear and Moment Diagram	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
11	3	Student understands and applies the material	Shear and stress in beams+ quiz	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
12	3	Student understands and applies the material	Shear Stresses in Beams	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion

13	3	Student understands and applies the material	Flexural Stresses in Beams+ quiz	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
14	3	Student understands and applies the material	Beam Deflections (Double Integration Method) + term exam	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
15	3	Student understands and applies the material	Beam Deflections (Double Integration Method)	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
16	3	Student understands and applies the material	Preparatory week before the final Exam	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion

11. Course Evaluation

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

		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	24% (24)	4,8,11,13	CLO-1,3, CLO-2,3, CLO-4,5, CLO-6
Formative assessment	Assignment	5	16% (16)	4,6,10,12,14	CLO-1,3, CLO-2,3, CLO-4,5, CLO-6 , CLO-7,8
Formative assessment	Projects / Lab.	0	0% (0)		
Formative assessment	Report	0	0% (0)		
Formative assessment	Midterm Exam	2hrs	10% (10)	14	CLO-1, CLO -2 CLO-3,CLO4,CLO5,CLO6
Summative assessment	Final Exam	3hrs	50% (50)	16	All
			100% (100 Marks)		

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Hibbeler, R.C. Mechanics of Materials. Pearson.
Main references (sources)	Singer, F.L. & Pytel, A. Strength of Materials. Harper & Row.
Recommended books and references (scientific journals, reports...)	Relevant peer-reviewed scientific journals and lecture notes prepared by the instructor.
Electronic References, Websites	Northern Technical University e-learning platforms (ntu.edu.iq) and Google Classroom; Iraqi Virtual Science Library (ivsl.org); open courseware such as NPTEL and MIT OpenCourseWare.

Course Description Form

1. Course Name:					
Soil Mechanics					
2. Course Code:					
EWRT 115					
3. Semester / Year:					
Semester 4 / Second Year – Academic Year 2025-2026					
4. Description Preparation Date:					
2/9/2025					
5. Available Attendance Forms:					
In-person attendance (FACE to FACE) – Language of instruction: English					
6. Number of Credit Hours (Total) / Number of Units (Total)					
Number of units (ECTS): 6 ECTS Weekly hours: 6 hrs (theory 4 + practical 2) Student workload: structured (SSWL) 90 h/sem + unstructured (USSWL) 60 h/sem = 150 h/sem					
7. Course administrator's name (mention all, if more than one name)					
Name: Asst. Prof. Dr. Abdalnaser Kashmoola Email: —					
8. Course Objectives					
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	Student understands and applies the material	Introduction, types of the soil, soil origin, and formation.	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
2+3	6	Student understands and applies the material	Physical properties of the soil, weight-volume relationships soil structures.	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
4	3	Student understands and applies the material	Lecture and Water content and GS tests	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
5	3	Student understands and applies the material	Soil plasticity and Atterberg limits, clay mineralogy.	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
6	3	Student understands and applies the material	Soil classification	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
7	3	Student understands and applies the material	Lecture, Atterberg's limits	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
8	3	Student understands and applies the material	Permeability of soils, Darcy's law, and soil coefficient of permeability.	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
9	3	Student understands and applies the material	Lecture and grain size distribution tests test.	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
10+11	3	Student understands and applies the material	Total and effective stresses and stresses due to external loads	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
12	3	Student understands and applies the material	Lecture and permeability test	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion

13-15	9	Student understands and applies the material	Seepage of the water through the earth dams.	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
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11. Course Evaluation

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

Evaluation type	Degree
Homework, classwork, reports (6)	2
Quizzes (2)	5
Term exam (2)	28
Laboratory, experimental part	15
Final exam 50	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:	
Water Quality Engineering	
2. Course Code:	
EWRT 116	
3. Semester / Year:	
Semester 4 / Second Year – Academic Year 2025-2026	
4. Description Preparation Date:	
2/9/2025	
5. Available Attendance Forms:	
In-person attendance (FACE to FACE) – Language of instruction: English	
6. Number of Credit Hours (Total) / Number of Units (Total)	
Number of units (ECTS): 6 ECTS Weekly hours: 5 hrs (theory 3 + practical 2) Student workload: structured (SSWL) 78 h/sem + unstructured (USSWL) 72 h/sem = 150 h/sem	
7. Course administrator's name (mention all, if more than one name)	
Name: Asst. Prof. Dr. Maha Mohamed Taha Hassan Email: maha.mohammed@ntu.edu.iq	
8. Course Objectives	
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.
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10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Student understands and applies the material	Introduction to Environment Lab 1: Solids, Dissolved and Suspended solids, and total solids	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
2	3	Student understands and applies the material	Hydrological Cycle of water from quantity sides. Lab 1: Solids, Dissolved and Suspended solids, and total solids	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
3	3	Student understands and applies the material	Properties of water sources, how water sources polluted. Lab 2: Turbidity	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
4	3	Student understands and applies the material	Effect of engineering project on water quality and self-purification. Lab 2: Turbidity	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
5-6	3	Student understands and applies the material	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 lecture + practical, discussion and problem solving	Quiz, homework, discussion
7	3	Student understands and applies the material	Calculate the change of dissolved oxygen along the riverbed due to wastewater. Lab 3: PH-value& Electrical Conductivity.	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion

8	3	Student understands and applies the material	Mid-term Exam Lab 4: Electrical conductivity	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
9	3	Student understands and applies the material	Calculate the change of deficit oxygen along the riverbed due to wastewater. Lab 4: Electrical Conductivity	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
10	3	Student understands and applies the material	Calculate the change of BoD along the riverbed due to wastewater Lab 5: Hardness	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
11-12	3	Student understands and applies the material	Effect of the quality and quantity of wastewater entering and leaving the lake. Lab 5: Hardness	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
13	3	Student understands and applies the material	Seasonal inversion in lakes, Effect of detergents on the pollution of the water Lab 6: Dissolved Oxygen	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
14	3	Student understands and applies the material	Study the type of pollution on the river. Lab 6: Dissolved Oxygen	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
15	3	Student understands and applies the material	Wastewater treatment	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion

11. Course Evaluation

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

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

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Davis, M.L. & Cornwell, D.A. Introduction to Environmental Engineering. McGraw-Hill.
Main references (sources)	APHA, AWWA & WEF. Standard Methods for the Examination of Water and Wastewater.
Recommended books and references (scientific journals, reports...)	Relevant peer-reviewed scientific journals and lecture notes prepared by the instructor.
Electronic References, Websites	Northern Technical University e-learning platforms (ntu.edu.iq) and Google Classroom; Iraqi Virtual Science Library (ivsl.org); open courseware such as NPTEL and MIT OpenCourseWare.

Course Description Form

1. Course Name:	
Drainage Engineering	
2. Course Code:	
EWRT 117	
3. Semester / Year:	
Semester 4 / Second Year – Academic Year 2025-2026	
4. Description Preparation Date:	
2/9/2025	
5. Available Attendance Forms:	
In-person attendance (FACE to FACE) – Language of instruction: English	
6. Number of Credit Hours (Total) / Number of Units (Total)	
Number of units (ECTS): 6 ECTS Weekly hours: 5 hrs (theory 5 + practical 0) Student workload: structured (SSWL) 78 h/sem + unstructured (USSWL) 72 h/sem = 150 h/sem	
7. Course administrator's name (mention all, if more than one name)	
Name: Alaa Imad Hamid Email: —	
8. Course Objectives	
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: . Definition of drainage, its purpose, evidence and benefits, as well as an overview of the history of drainage in Iraq. (i) . Learn the basics of groundwater movement by studying Darcy's law, Laplace's equation, and Dupuis-Forchheimer's equation. (i) . Learn about the reclamation of saline soils, salts removal, and the requirements for washing them. (i) . Learn the exploratory and design investigations of drainage projects. (ii) . Studying the various methods used to estimate the hydraulic conductivity of soils in the laboratory and field. (ii) . Identifying the different drainage systems through their types, planning their locations and depths, and designing filters. (i) . Learn the basics of designing surface (open) and subsurface (covered) drainage sections. (ii) . Designing the distances between the drains in the case of stable and unstable flow. (ii) - Identifying the vertical drainage (drainage wells). (ii) . Learn drainage maintenance. (ii)

	. The relationship between drainage and environmental pollution. (i). To investigate the effect of wastewater on rivers and the different types of pollution that can occur. . To understand the impact of detergents on water pollution. . To study the different types of pollution that can affect rivers and their ecosystems.
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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.
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10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Student understands and applies the material	General introduction on drainage of agricultural lands	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
2-3	4	Student understands and applies the material	Principles of groundwater hydraulics	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
4-5	4	Student understands and applies the material	Reclamation of saline soils	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
6	4	Student understands and applies the material	Drainage projects' investigations	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
7-8	2	Student understands and applies the material	Estimation of soil hydraulic conductivity	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
9	4	Student understands and applies the material	Drainage systems	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
10	2	Student understands and applies the material	Design of drains' sections	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
11-13	2	Student understands and applies the material	Spacing between drains	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion

14	6	Student understands and applies the material	Vertical drainage (drainage wells)	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
15	2	Student understands and applies the material	Drains' maintenance Drainage and water pollution	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion

11. Course Evaluation

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

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

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Ritzema, H.P. (ed.) (1994). Drainage Principles and Applications. ILRI Publication 16.
Main references (sources)	Smedema, L.K., Vlotman, W.F. & Rycroft, D.W. Modern Land Drainage. CRC Press.
Recommended books and references (scientific journals, reports...)	Relevant peer-reviewed scientific journals and lecture notes prepared by the instructor.
Electronic References, Websites	Northern Technical University e-learning platforms (ntu.edu.iq) and Google Classroom; Iraqi Virtual Science Library (ivsl.org); open courseware such as NPTEL and MIT OpenCourseWare.

Course Description Form

1. Course Name:					
Professional Ethics					
2. Course Code:					
NTU 201					
3. Semester / Year:					
Semester 4 / Second Year – Academic Year 2025-2026					
4. Description Preparation Date:					
2/9/2025					
5. Available Attendance Forms:					
In-person attendance (FACE to FACE) – Language of instruction: English					
6. Number of Credit Hours (Total) / Number of Units (Total)					
Number of units (ECTS): 2 ECTS Weekly hours: 2 hrs (theory 2 + practical 0) Student workload: structured (SSWL) 33 h/sem + unstructured (USSWL) 17 h/sem = 50 h/sem					
7. Course administrator's name (mention all, if more than one name)					
Name: Asst. Prof. Abdullah Ahmed Sheikho Email: Abidallah.shekho@ntu.edu.iq					
8. Course Objectives					
Course Objectives	Course Objectives Gain knowledge of major ethical theories and how they apply to professional conduct. Familiarize with the codes of conduct and ethical standards relevant to various professions. Learn frameworks for making ethical decisions in complex, real-world situations.				
9. Teaching and Learning Strategies					
Strategy	world case studies to allow students to apply ethical principles and decision-making frameworks to actual professional dilemmas. Engage students in role- where they must navigate ethical challenges and justify their decisions.				
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method

1-2	4	Student understands and applies the material	Overview of ethical theories (utilitarianism, deontology, virtue ethics) Introduction to professional ethics and codes of conduct	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
3-4	4	Student understands and applies the material	Frameworks for ethical decision-making Case studies and practical applications	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
5-6	4	Student understands and applies the material	Identifying and managing conflicts of interest Strategies for ethical conflict resolution	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
7-8	4	Student understands and applies the material	Ethical considerations and protections for whistleblowers Case studies on whistleblowing	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
9-10	4	Student understands and applies the material	The role of businesses in society Ethical responsibilities of corporations	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
11-15	8	Student understands and applies the material	Business ethics Media ethics Medical ethics Legal ethics Engineering ethics	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion

11. Course Evaluation

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

Evaluation type	Degree
quizzes 2	10
Term exam	30
Final exam	60
Total	100

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Fleddermann, C.B. Engineering Ethics. Pearson.
Main references (sources)	Harris, C.E. et al. Engineering Ethics: Concepts and Cases. Cengage.
Recommended books and references (scientific journals, reports...)	Relevant peer-reviewed scientific journals and lecture notes prepared by the instructor.
Electronic References, Websites	Northern Technical University e-learning platforms (ntu.edu.iq) and Google Classroom; Iraqi Virtual Science Library (ivsl.org).

Course Descriptions – Third Year

Course Description Form

1. Course Name:			
Sewer Networks			
2. Course Code:			
EWRT 118			
3. Semester / Year:			
Semester 5 / Third Year – Academic Year 2025-2026			
4. Description Preparation Date:			
2/9/2025			
5. Available Attendance Forms:			
In-person attendance (FACE to FACE) – Language of instruction: English			
6. Number of Credit Hours (Total) / Number of Units (Total)			
Number of units (ECTS): 6 ECTS Weekly hours: 3 hrs (theory 3 + practical 0) Student workload: structured (SSWL) 48 h/sem + unstructured (USSWL) 102 h/sem = 150 h/sem			
Structured SWL (h/sem)	48	Structured SWL (h/w)	5.2
Unstructured SWL (h/sem)	102	Unstructured SWL (h/w)	6.2
Total SWL (h/sem)	150		
7. Course administrator's name (mention all, if more than one name)			
Name: Asst. Prof. Dr. Abdalnaser Kashmoola Email: —			
8. Course Objectives			
Course Objectives	Course Objectives The course aim to describe the quantity and quality properties of wastewater and storm water, and learns the engineering methods used in the analysis and design of sanitary sewers networks, storm sewers networks, and plumbing networks. The course covers describing the main appurtenances of sewers networks system in addition to domestic plumbing system Learning Outcomes CLO-1: Describing the different properties of wastewater in addition to its flow rate (i). CLO-2: Describing the main appurtenances of sewers networks system in addition to domestic plumbing networks (i). CLO-3: Describing the properties of storm water and learning the method used in the quantity determination (i) and (ii).		

	CLO-4: Learning the engineering methods used in the analysis and design of sanitary and storm sewers networks (ii). CLO-5: Learning skills in the design and analysis of sewers network using computer software (i) and (iv). الدراسية CLO-6: Learning the engineering methods used in the analysis and design of sanitary networks, storm networks, and water supply networks of domestic plumbing (ii).
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9. Teaching and Learning Strategies

Strategy	The course will be covered by class room lectures; four hours each week for explaining the materials with giving examples, and one hour for tutorials problems. Explanation on necessary computer software will be given and a project on an actual network will be submitted by one student or group.
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10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Student understands and applies the material	Physical, chemical, and biological properties of wastewater	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
2,3	3	Student understands and applies the material	Components of wastewater flow and wastewater flow rate. Selection of design flow rate and mass loadings.	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
4	3	Student understands and applies the material	Sewers systems types, sanitary sewers design activities, sanitary sewer types.	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
5,6	3	Student understands and applies the material	Sanitary sewers design: flow rate estimation, pipe material selection, design criteria definition, design equation selection, design execution and maps preparation, examples. Types of storm water networks, rational method for runoff water flow rate estimation.	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion

7,8	3	Student understands and applies the material	Sewers network appurtenances: manholes, inverted siphon, outlets and outfalls, alternative sewers systems, lift stations.	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
9	3	Student understands and applies the material	Inlets: gutter, types of inlets: grate inlet, curb inlet, combination inlet,	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
10,11,12	3	Student understands and applies the material	Inlets in sag location, inlets spacing. Sanitary sewers software applications. Storm sewers software applications	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
13,14,15	3	Student understands and applies the material	Plumbing: plumbing code, fixture types, fixture unit, water supply network. Sanitary drainage network. Storm drainage network .	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion

11. Course Evaluation

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

		Time/Number	Weight (Marks)	Week Due	Relevant Learning outcome
Formative assesment	quizzes	8	33 % (33)	2,3,5,7,9,11,13,14	CLO-1, CLO-2, CLO-2, CLO-3, CLO-4, CLO-4, CLO-4, CLO-6
Formative assesment	Assignments	0	0%		
Formative assesment	Projects / Lab	1	7%	13	CLO-5
Formative assesment	report	0	0%		
Summative assessment	Midterm Exam	2HR	10%	7	All except CLO-5
Summative assessment	Final exam	3HR	50%	16	All except CLO-5
Total assessment				100%(100 marks)	

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Metcalf & Eddy (1981). Wastewater Engineering: Collection and Pumping of Wastewater. McGraw-Hill.
Main references (sources)	Viessman, W. & Hammer, M.J. Water Supply and Pollution Control. Pearson.
Recommended books and references (scientific journals, reports...)	Relevant peer-reviewed scientific journals and lecture notes prepared by the instructor.
Electronic References, Websites	Northern Technical University e-learning platforms (ntu.edu.iq) and Google Classroom; Iraqi Virtual Science Library (ivsl.org); open courseware such as NPTEL and MIT OpenCourseWare.

Course Description Form

1. Course Name:			
Air Pollution Control			
2. Course Code:			
EWRT 119			
3. Semester / Year:			
Semester 5 / Third Year – Academic Year 2025-2026			
4. Description Preparation Date:			
2/9/2025			
5. Available Attendance Forms:			
In-person attendance (FACE to FACE) – Language of instruction: English			
6. Number of Credit Hours (Total) / Number of Units (Total)			
Number of units (ECTS): 6 ECTS Weekly hours: 4 hrs (theory 4 + practical 0) Student workload: structured (SSWL) 63 h/sem + unstructured (USSWL) 87 h/sem = 150 h/sem			
Structured SWL (h/sem)	63	Structured SWL (h/w)	4.2
UN Structured SWL (h/sem)	87	Unstructured SWL (h/w)	4.1
Total SWL (h/sem)			150
7. Course administrator's name (mention all, if more than one name)			
Name: Asst. Prof. Dr. Mohammad Akram Saadi Ayoub Al-Dabbagh Email: mohamed.akram@ntu.edu.iq			
8. Course Objectives			
Course Objectives	Course Objectives The aim of this course will cover air pollution equipment's control. Initially students will learn how to apply the basic principles of sciences and engineering to solve issues Module Objectives associated with air pollution basics and control. Upon completion of this course students will be able to: - Apply the treatment practices and devices due to the types of pollutants; - Understand the design procedures for any type of air pollutant through assignments that demonstrate accomplishment of this outcome, and test problems and tutorials. Learning Outcomes CLO-1: Apply the basic principles of engineering and sciences to solve issues associated with air pollution basics and control. (i) CLO-2: Knowing the air pollution control techniques and types; (i) CLO-3: Apply the control practices and devices according to the types of CLO-4: Design procedures for controlling equipment of particulates air		

	CLO-5: Design procedures for controlling equipment of gaseous air pollutants. (ii) CLO-6: Design project for specific air pollutants control device,(vii)
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9. Teaching and Learning Strategies

Strategy	This course has several components that include lectures, individual and group assignments, field visit, and e-learning platforms. Exercises involving problems and tutorial sheets. The course will be taught in English, and all mandatory assignments have to be submitted within the deadlines to be admitted to the exams.
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10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	Student understands and applies the material	Classification of air pollution control equipment.	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
2	4	Student understands and applies the material	Particles separation technique	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
3	4	Student understands and applies the material	Gravity settling chamber,	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
4	4	Student understands and applies the material	Centrifugal separators (cyclones), types and concept	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
5	4	Student understands and applies the material	Centrifugal separators (cyclones), design procedures	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
6	4	Student understands and applies the material	Filter baghouse,	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
7	4	Student understands and applies the material	Electrostatics precipitators.	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion

8	4	Student understands and applies the material	Electrostatics precipitators.	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
9	4	Student understands and applies the material	Gaseous pollutants control technique	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
10	4	Student understands and applies the material	Wet scrubber (Venture scrubbers),	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
11	4	Student understands and applies the material	Absorption,	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
12	4	Student understands and applies the material	Adsorption	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
13,14,15	4	Student understands and applies the material	(DeSO _x) Flue Gas Desulfurization Control Technologies for Nitrogen Oxides (DeNO _x) Control Technologies for Nitrogen Oxides (DeNO _x)	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion

11. Course Evaluation

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

		Time/Number	Weight (Marks)	Week Due	Relevant Learning outcome
Formative assesment	quizzes	4	15%	2, 4,6,and 9	CLO-1, CLO-3, CLO-4, CLO-5
Formative assesment	Assignments	4	15%	3, 5, 9and 12	CLO-3, CLO-4, CLO-5
Formative assesment	Projects / Lab	1	10%	14	all
Formative assesment	report	---	----	---	-----

Summative assessment	Midterm Exam	2HR	10%	10	CLO-1, CLO-2, CLO-3, CLO-4, CLO-5
Summative assessment	Final exam	3HR	50%	16	CLO-1, CLO-2, CLO-3, CLO-4, CLO-5
Total assessment				100%(100 marks)	
12. Learning and Teaching Resources					
Required textbooks (curricular books, if any)			de Nevers, N. Air Pollution Control Engineering. McGraw-Hill.		
Main references (sources)			Cooper, C.D. & Alley, F.C. Air Pollution Control: A Design Approach. Waveland Press.		
Recommended books and references (scientific journals, reports...)			Relevant peer-reviewed scientific journals and lecture notes prepared by the instructor.		
Electronic References, Websites			Northern Technical University e-learning platforms (ntu.edu.iq) and Google Classroom; Iraqi Virtual Science Library (ivsl.org); open courseware such as NPTEL and MIT OpenCourseWare.		

Course Description Form

1. Course Name:	
Advanced Surface Hydrology	
2. Course Code:	
EWRT 120	
3. Semester / Year:	
Semester 5 / Third Year – Academic Year 2025-2026	
4. Description Preparation Date:	
2/9/2025	
5. Available Attendance Forms:	
In-person attendance (FACE to FACE) – Language of instruction: English	
6. Number of Credit Hours (Total) / Number of Units (Total)	
Number of units (ECTS): 6 ECTS Weekly hours: 5 hrs (theory 5 + practical 0) Student workload: structured (SSWL) 78 h/sem + unstructured (USSWL) 72 h/sem = 150 h/sem	
7. Course administrator's name (mention all, if more than one name)	
Name: Asst. Prof. Abdullah Ahmed Sheikho Email: Abidallah.shekho@ntu.edu.iq	
8. Course Objectives	
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 Learning Outcomes By the end of the module students should be able to: - Explain the hydrologic cycle and its components - Explain precipitation processes, surface water flow and hydrographs - Understand the principals of rainfall-runoff modelling and apply the Rational method for designing culverts and channels - Perform hydrologic and hydraulic flood routing - Have a good understanding of the principals of Groundwater flow and Darcy's law - Understand and solve problems of flow through confined and unconfined aquifers - Calculate groundwater water levels by applying knowledge of well hydraulics

		Understand how to build a simple hydrologic model in a software (e.g. HEC-HMS) Learn the concept of model calibration and calibrate a hydrologic model.			
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
1,2,3	5	Student understands and applies the material	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 Typical Failure Factors for Hydraulic Installations, Source of Data. Introduction, Climate Factors, Temperature, Solar Radiation, Evaporation, Humidity, Vapor Pressure, and Wind.	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion

4,5	5	Student understands and applies the material	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 lecture, discussion and problem solving	Quiz, homework, discussion
6,7,8	5	Student understands and applies the material	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. 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. Evaporimeter, Types of evaporation meters, Class A Evaporation Pan, Pan Coefficien, Evaporation Measurement Stations, Empirical Evaporation Equations, Analytical methods for estimating	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion

9,10	5	Student understands and applies the material	Types of evaporation meters, reducing evaporation from tanks. Evapotranspiration, Potential Evapotranspiration Equations, Infiltration, Measurement of Infiltration, Infiltration Capacity Values, Infiltration Indices.	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
11,12,13	5	Student understands and applies the material	Knowing the Water stage 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	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
14,15	5	Student understands and applies the material	Unit Hydrograph Assumptions, Unit Hydrograph Derivation, Unit Hydrograph for Different Duration Flood Routing, Hydrologic Storage Routing, Hydrologic Channel Routing.	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion

11. Course Evaluation

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

Evaluation type	Mark
Quizzes	10
Homework and reports	10
Attendance, participation and class activities	10
Mid-term examination	20
Final examination	50
Total	100

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Chow, V.T., Maidment, D.R. & Mays, L.W. (1988). Applied Hydrology. McGraw-Hill.
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Main references (sources)	Bedient, P.B., Huber, W.C. & Vieux, B.E. Hydrology and Floodplain Analysis. Pearson.
Recommended books and references (scientific journals, reports...)	Relevant peer-reviewed scientific journals and lecture notes prepared by the instructor.
Electronic References, Websites	Northern Technical University e-learning platforms (ntu.edu.iq) and Google Classroom; Iraqi Virtual Science Library (ivsl.org); open courseware such as NPTEL and MIT OpenCourseWare.

Course Description Form

1. Course Name:	
Hydraulics Applications	
2. Course Code:	
EWRT 121	
3. Semester / Year:	
Semester 5 / Third Year – Academic Year 2025-2026	
4. Description Preparation Date:	
2/9/2025	
5. Available Attendance Forms:	
In-person attendance (FACE to FACE) – Language of instruction: English	
6. Number of Credit Hours (Total) / Number of Units (Total)	
Number of units (ECTS): 6 ECTS Weekly hours: 4 hrs (theory 3 + practical 1) Student workload: structured (SSWL) 63 h/sem + unstructured (USSWL) 87 h/sem = 150 h/sem	
7. Course administrator's name (mention all, if more than one name)	
Name: Asst. Prof. Dr. Abdalnaser Kashmoola Email: —	
8. Course Objectives	
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. Learning Outcomes On successful completion of this module students will achieve the following learning outcomes. MO1 Demonstrate a detailed knowledge and understanding of the application of hydraulics to describe and solve problems encountered in civil engineering. MO2 Assess and apply the requirements involved in the civil engineering design of a range of hydraulic structures. MO3 Generate feasibility studies by selecting appropriate systems ,technologies and materials for a large-scale hydraulic application and by employing elementary technical-economical optimization.
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	Student understands and applies the material	Dimensionless analysis Modelling in pipes and open channel	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
3	4	Student understands and applies the material	Flow in pipes, general equations	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
4,5,6	4	Student understands and applies the material	Laminar and turbulent flow in pipes Distribution of velocities and shear stress in pipes Flow in smooth pipes, seventh root law	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
7,8,9	4	Student understands and applies the material	Flow in rough pipes Classification of rough and smooth flow in pipes Flow in non-circular pipes	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
10	4	Student understands and applies the material	Minor losses of the fittings, flow in orifice and syphon	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
11	4	Student understands and applies the material	Connect pipes in parallel and series	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
12	4	Student understands and applies the material	Branched channel, connection with tanks	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
13	4	Student understands and applies the material	Hardy- cross method to measure discharge in each pipe of a networks	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion

14,15	4	Student understands and applies the material	Pumps: introduction, connections and efficiency Pumps in parallel and series	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
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11. Course Evaluation

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

Evaluation type	Mark
Quizzes	10
Homework and reports	10
Attendance, participation and class activities	10
Mid-term examination	20
Final examination	50
Total	100

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Chadwick, A., Morfett, J. & Borthwick, M. Hydraulics in Civil and Environmental Engineering. CRC Press.
Main references (sources)	Chanson, H. The Hydraulics of Open Channel Flow. Elsevier.
Recommended books and references (scientific journals, reports...)	Relevant peer-reviewed scientific journals and lecture notes prepared by the instructor.
Electronic References, Websites	Northern Technical University e-learning platforms (ntu.edu.iq) and Google Classroom; Iraqi Virtual Science Library (ivsl.org); open courseware such as NPTEL and MIT OpenCourseWare.

Course Description Form

1. Course Name:			
Survey Applications			
2. Course Code:			
EWRT 122			
3. Semester / Year:			
Semester 5 / Third Year – Academic Year 2025-2026			
4. Description Preparation Date:			
2/9/2025			
5. Available Attendance Forms:			
In-person attendance (FACE to FACE) – Language of instruction: English			
6. Number of Credit Hours (Total) / Number of Units (Total)			
Number of units (ECTS): 6 ECTS Weekly hours: 5 hrs (theory 2 + practical 3) Student workload: structured (SSWL) 78 h/sem + unstructured (USSWL) 72 h/sem = 150 h/sem			
Student Workload (SWL)			
Structured SWL (h/sem)	78	Structured SWL (h/w)	6.2
Unstructured SWL (h/sem)	72	Unstructured SWL (h/w)	3.8
Total SWL (h/sem)			150
7. Course administrator's name (mention all, if more than one name)			
Name: Asst. Prof. Dr. Adnan Abdul Wahab Ismail Email: adnan.ismael@ntu.edu.iq			
8. Course Objectives			
Course Objectives	Course Objectives This course aims to introduce the students to the category of Engineering surveying . Introductory and definitions, which are used in plane surveying: Instruments for measuring distance obstacles in measurements Instruments for setting out right angles, Tape corrections. Leveling, Areas, and volumes. Computation of volumes. The Theodolite and Traverse surveying. Tachometry. Curves. Total instrument station, GPS field procedure. This will be achieved through descriptive lectures Learning Outcomes study weeks.		

	CLO-1: The students will be able to define and distinguish the fundamentals of measuring. (i) CLO-2: after taking analysis and synthesis design processes, the student can make a primary design of some issues of roads (ii) CLO-3: The student will be able to conduct some tests and measurements of surveying, like elevations and coordinates using different devices. (iii) CLO-4: The students will be able to make suitable judgments in engineering situations of surveying problems like road construction. (v) CLO-5: Report the data obtained from the selective topics of surveying topics given and organized during the course (iv) CLO-6: Creating some opinions about the emerging environmental issues and trying to give some solutions compatible with the problems related to surveying aspects (vii)
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9. Teaching and Learning Strategies

Strategy	This course has several components that include lectures, individual or group assignments, rock lab visits, and e-learning platforms. The course will be taught in Arabic and English, and all mandatory reports have to be submitted within the deadlines
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10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1&2&3&4	5	Student understands and applies the material	Basic Definitions, Types of Surveying, Units, and conversions Linear measurements tape measurements corrections	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
5&6&7	5	Student understands and applies the material	Leveling definitions and instruments Leveling methods Longitudinal and cross-sections	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
8&9	5	Student understands and applies the material	Contouring Contouring	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
10&11&12 13&14,15	5	Student understands and applies the material	Theodolites Angles, bearings Coordinates Total Station Surveying GPS principles Vertical Curves	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion

11. Course Evaluation

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

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	quizzes	4	20	3, 6, 9 and 12	CLO-1, CLO-1, CLO-2, CLO-4
Formative assessment	Assignments	7	10		All
Formative assessment	Project lab				
Formative assessment	Report	10	10		All
Summative assessment	Midterm Exam	2hr	10	7	CLO-1, CLO -2 and CLO-3
Summative assessment	Final Exam	3hr	50	16	all
Total assessment			100 %		

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Ghilani, C.D. & Wolf, P.R. Elementary Surveying: An Introduction to Geomatics. Pearson.
Main references (sources)	Schofield, W. & Breach, M. Engineering Surveying. Elsevier.
Recommended books and references (scientific journals, reports...)	Relevant peer-reviewed scientific journals and lecture notes prepared by the instructor.
Electronic References, Websites	Northern Technical University e-learning platforms (ntu.edu.iq) and Google Classroom; Iraqi Virtual Science Library (ivsl.org); open courseware such as NPTEL and MIT OpenCourseWare.

Course Description Form

1. Course Name:			
Environmental Thermodynamics			
2. Course Code:			
EWRT 123			
3. Semester / Year:			
Semester 6 / Third Year – Academic Year 2025-2026			
4. Description Preparation Date:			
2/9/2025			
5. Available Attendance Forms:			
In-person attendance (FACE to FACE) – Language of instruction: Arabic			
6. Number of Credit Hours (Total) / Number of Units (Total)			
Number of units (ECTS): 4 ECTS Weekly hours: 3 hrs (theory 2 + practical 1) Student workload: structured (SSWL) 48 h/sem + unstructured (USSWL) 52 h/sem = 100 h/sem			
Student Workload (SWL)			
Structured SWL (h/sem)	48	Structured SWL (h/w)	3.2
Unstructured SWL (h/sem)	52	Unstructured SWL (h/w)	3.5
Total SWL (h/sem)			100
7. Course administrator's name (mention all, if more than one name)			
Name: Asst. Prof. Dr. Maha Mohamed Taha Hassan Email: maha.mohammed@ntu.edu.iq			
8. Course Objectives			
Course Objectives	Course Objectives تمكين الطالب من معرفة المفاهيم النظرية والعملية للعمليات الديناميكية الحرارية تمكين الطالب من معرفة المفاهيم النظرية والعملية لخصائص المواد الفيزيائية وتأثير الحرارة عليها. تمكين الطالب من قياس درجة الحرارة والضغط بأجهزة القياس التقليدية والحديثة. تمكين الطالب من معرفة أنواع الطاقة وتطبيقاتها. تطوير المبادئ والقوانين الأساسية للترموديناميك واستكشاف آثار هذه المبادئ على سلوك النظام بما في ذلك-صياغة النماذج اللازمة للدراسة. تمكين الطالب من التعرف على أنواع الأنظمة وتطبيقاتها وكيفية التعامل معها. القدرة على التعامل مع المفاهيم رياضياتي ١ ، والفهم الوظيفي لكيفية تنفيذ هذه الأفكار في العالم الحقيقي. تحليل وتصميم أنظمة نقل الحرارة من خلال تطبيق هذه المبادئ.		

استخدم الرسوم البيانية والرسوم البيانية لتوصيل النتائج.

تطوير مهارات حل المشكلات الأساسية للممارسة الهندسية الجيدة لنقل الحرارة في تطبيقات العالم الحقيقي.

اقرار الاستراتيجيات التي سيتم استخدامها والاقتراضات التي يجب وضعها.

Learning Outcomes

دراسة بعض المفاهيم والتعاريف وأنواع الأنظمة

قياس الضغط ودرجة الحرارة ومعرفة وشرح مبدأ عمل الأجهزة من درجة الحرارة

دراسة المفاهيم الأساسية للديناميكا الحرارية

تطوير قدرة مرنة وإبداعية على حل المشكلات وترجمة الأوصاف الفيزيائية إلى معادلات رياضية

فحص النتائج المتوسطة أو الكميات الأخرى التي يمكن استخدامها لضمان التوصل إلى حل

تحديد ما لا يفهمونه وطرح أسئلة محددة لاكتساب الفهم وتطوير قدرتهم على إيصال الأفكار العلمية

تمكين الطلاب من استخدام برامج البحث على الإنترنت للاستفادة من المصادر، وتمكين الطالب من

اليومية الخاصة بالديناميكا الحرارية وإعداد كتيبات تتناول التأثيرات الحرارية على البيئة

تمكين الطالب من العمل في المراكز البحثية والمؤسسات الصناعية

فهم وتطبيق الفكرة الأساسية لنظرية انتقال الحرارة على الأنظمة الفيزيائية

دراسة أنواع الطاقة وتطبيقاتها

دراسة الفرق بين الأنظمة المغلقة والمفتوحة، وشرح النماذج الرياضية للأنظمة الفيزيائية وتحديد ووصف مبدأ الحالة المستقرة

طريقة انتقال الحرارة

القدرة على تحديد المشكلات الهندسية المعقدة وتحليلها وحلها وفق المبادئ الهندسة والعلوم والرياضيات

القدرة على اكتساب وتطبيق المعرفة الجديدة واستخدام استراتيجيات التعلم المناسبة

القدرة على المشاركة والعمل بشكل احترافي وأخلاقي في مشاريع مختلفة للعمل ضمن فرق متعددة

يتضمن المحتوى ما يلي :

الكميات الأساسية،

- النظام الدولي للوحدات وكتلة الوحدات ومختصراتها بشكل صحيح

- تنمية قدرة الطالب على فهم الأجسام الديناميكية الحرارية.

- التعرف على أنواع الطاقة وتطبيقاتها.

- معرفة الفرق بين انتقال الحرارة والشغل.

- كيف يمكن حساب الحرارة المفقودة والمكتسبة من أو عن طريق النظام.

- كيف يمكن حساب الطاقة من أو عن طريق النظام.

- تمييز انتقال الحرارة في النظام المغلق.

- تمييز العمل في النظام المغلق.

أنواع الطاقة وتطبيقاتها:

- ذكر وشرح وتطبيق الفرق بين ضغط المقياس.

	- التفريق بين الضغط للمواد الصلبة والسائلة والغازية. - كيف يمكن حساب ونقل الوحدات. - حل المشاكل ل قانون الغاز المثالي - ما هو الغاز المثالي (- دراسة قانون الغاز العام. - سلوك العديد من ثابت الغاز وقانون بويل وقانون تشارلز وقانون جاي لوساك. القانون الأول للديناميكا الحرارية وتطبيقاته من أجل التعامل مع موضوع الديناميكا الحرارية التطبيقية بدقة من الضروري معرفة الفرق بين التطبيقات. حالة سائل العم. - دراسة معادلة عدم التدفق. - دراسة معادلة التدفق الثابت. - الفرق بين النظام المغلق والنظام المفتوح وتطبيقاتهما - انتقال الحرارة بالتوصيل. - انتقال الحرارة بالحمل الحراري. - انتقال الحرارة بالإشعاع
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9. Teaching and Learning Strategies

Strategy	ستكون الإستراتيجية الأساسية لتقديم هذه الوحدة هي تشجيع الطلاب على المشاركة في التمارين مع تحسين وتوسيع مهارات التفكير النقدي لديهم. وسيتم تحقيق ذلك من خلال الفصول الدراسية والبرامج التعليمية التفاعلية والنظر في التجارب البسيطة التي تتضمن أنشطة أخذ العينات التي يجدها الطلاب مثيرة للاهتمام.
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10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Student understands and applies the material	المقدمة والأبعاد والوحدة. بعض المفاهيم والتعاريف وأنواع الأنظمة	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
2	3	Student understands and applies the material	قياس الضغط ودرجة الحرارة	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
3	3	Student understands and applies the material	قوانين الغاز المثالية	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion

4	3	Student understands and applies the material	ورقة المسائل المحولة رقم ١ الواجب المنزلي ١ اختبار	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
5	3	Student understands and applies the material	امتحان نصف الفصل	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
6	3	Student understands and applies the material	قوانين الديناميكا الحرارية / القانون الأول للديناميكا الحرارية العمليات الديناميكية الحرارية - تطبق على عملية النظام المغل	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
7	3	Student understands and applies the material	ورقة المسائل المحولة رقم ٣ الواجب المنزلي ٣ اختبار	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
8	3	Student understands and applies the material	عمليات الديناميكية الحرارية - مطبقة على عملية النظام المفتوح	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
9	3	Student understands and applies the material	ورقة المسائل المحولة رقم ٤ الواجب المنزلي ٤ اختبار	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
10	3	Student understands and applies the material	طرق انتقال الحرارة	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
11	3	Student understands and applies the material	التطبيق البيئي لنقل الحرارة	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
12	3	Student understands and applies the material	العمليات متساوية الحرارة وغير متساوية الحرارة	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
13	3	Student understands and applies the material	ورقة المسائل المحولة رقم ٥ الواجب المنزلي ٥ اختبار	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion

14	3	Student understands and applies the material	الامتحان النهائي للفصل الدراسي	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
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11. Course Evaluation

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

Evaluation type	Mark
Quizzes	10
Homework and reports	10
Attendance, participation and class activities	10
Mid-term examination	20
Final examination	50
Total	100

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Çengel, Y.A. & Boles, M.A. Thermodynamics: An Engineering Approach. McGraw-Hill.
Main references (sources)	Çengel, Y.A. Heat and Mass Transfer. McGraw-Hill.
Recommended books and references (scientific journals, reports...)	Relevant peer-reviewed scientific journals and lecture notes prepared by the instructor.
Electronic References, Websites	Northern Technical University e-learning platforms (ntu.edu.iq) and Google Classroom; Iraqi Virtual Science Library (ivsl.org); open courseware such as NPTEL and MIT OpenCourseWare.

Course Description Form

1. Course Name:	
Numerical Analysis	
2. Course Code:	
EWRT 124	
3. Semester / Year:	
Semester 6 / Third Year – Academic Year 2025-2026	
4. Description Preparation Date:	
2/9/2025	
5. Available Attendance Forms:	
In-person attendance (FACE to FACE) – Language of instruction: English	
6. Number of Credit Hours (Total) / Number of Units (Total)	
Number of units (ECTS): 5 ECTS Weekly hours: 3 hrs (theory 3 + practical 0) Student workload: structured (SSWL) 45 h/sem + unstructured (USSWL) 80 h/sem = 125 h/sem	
7. Course administrator's name (mention all, if more than one name)	
Name: Alaa Imad Hamid Email: —	
8. Course Objectives	
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).
9. Teaching and Learning Strategies	
Strategy	Interactive theoretical lectures using the whiteboard and modern presentation tools (Data Show).

	Solving problems and applied examples with student participation to develop critical thinking and problem-solving skills. Homework, quizzes and reports, supported by e-learning platforms (Google Classroom).
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10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Numerical Methods: Iteration and graphical method	Numerical Solution of Algebraic Equations	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
1	3	Bisection method	Numerical Solution of Algebraic Equations	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
1	3	False position method	Numerical Solution of Algebraic Equations	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
1	3	Newton-Raphson's method	Numerical Solution of Algebraic Equations	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
1	3	Maclaurin series	Numerical Series	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
4	12	Taylor's series	Numerical Series	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
2	6	Euler's method	Numerical Series	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
2	6	Runge's -Kutta method	Solution of D.E.	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
2	6	Interpolation:Gregory Newton forward interpolation method	Interpolation	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion

11. Course Evaluation

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

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)	Chapra, S.C. & Canale, R.P. Numerical Methods for Engineers. McGraw-Hill.
Main references (sources)	Burden, R.L. & Faires, J.D. Numerical Analysis. Cengage.
Recommended books and references (scientific journals, reports...)	Relevant peer-reviewed scientific journals and lecture notes prepared by the instructor.
Electronic References, Websites	Northern Technical University e-learning platforms (ntu.edu.iq) and Google Classroom; Iraqi Virtual Science Library (ivsl.org); open courseware such as NPTEL and MIT OpenCourseWare.

Course Description Form

1. Course Name:	
Reinforced Concrete	
2. Course Code:	
EWRT 125	
3. Semester / Year:	
Semester 6 / Third Year – Academic Year 2025-2026	
4. Description Preparation Date:	
2/9/2025	
5. Available Attendance Forms:	
In-person attendance (FACE to FACE) – Language of instruction: English	
6. Number of Credit Hours (Total) / Number of Units (Total)	
Number of units (ECTS): 5 ECTS Weekly hours: 5 hrs (theory 3 + practical 2) Student workload: structured (SSWL) 78 h/sem + unstructured (USSWL) 47 h/sem = 125 h/sem	
7. Course administrator's name (mention all, if more than one name)	
Name: Asst. Prof. Dr. Mohammad Akram Saadi Ayoub Al-Dabbagh Email: mohamed.akram@ntu.edu.iq	
8. Course Objectives	
Course Objectives	Course Objectives [In 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	Interactive theoretical lectures using the whiteboard and modern presentation tools (Data Show). Solving problems and applied examples with student participation to develop critical thinking and problem-solving skills. Practical sessions in the laboratory/field and writing technical reports on the experiments. Homework, quizzes and reports, supported by e-learning platforms (Google Classroom).

10. Course Structure

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

11. Course Evaluation

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

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)	McCormac, J.C. & Brown, R.H. Design of Reinforced Concrete. Wiley.
Main references (sources)	ACI Committee 318. Building Code Requirements for Structural Concrete (ACI 318).
Recommended books and references (scientific journals, reports...)	Relevant peer-reviewed scientific journals and lecture notes prepared by the instructor.
Electronic References, Websites	Northern Technical University e-learning platforms (ntu.edu.iq) and Google Classroom; Iraqi Virtual Science Library (ivsl.org); open courseware such as NPTEL and MIT OpenCourseWare.

Course Description Form

1. Course Name:	
Wastewater Treatment Plant Design	
2. Course Code:	
EWRT 126	
3. Semester / Year:	
Semester 6 / Third Year – Academic Year 2025-2026	
4. Description Preparation Date:	
2/9/2025	
5. Available Attendance Forms:	
In-person attendance (FACE to FACE) – Language of instruction: English	
6. Number of Credit Hours (Total) / Number of Units (Total)	
Number of units (ECTS): 6 ECTS Weekly hours: 5 hrs (theory 4 + practical 1) Student workload: structured (SSWL) 78 h/sem + unstructured (USSWL) 72 h/sem = 150 h/sem	
7. Course administrator's name (mention all, if more than one name)	
Name: Asst. Prof. Dr. Maha Mohamed Taha Hassan Email: maha.mohammed@ntu.edu.iq	
8. Course Objectives	
Course Objectives	Course Objectives Recognize the common physical, chemical and biological unit operations encountered in treatment processes (i) • Apply the basic concepts of sciences and engineering to solve issues associated with the treatment of wastewater (i) • Formulate a preliminary design of wastewater treatment plant including preliminary, primary, secondary, and tertiary treatment units (ii) • Develop and solve design problems and analyze the data to evaluate the feasibility of a components of the wastewater treatment plant (ii). • Report the data obtained from the site visits to WWTP that will be organized during the course (iv) • Demonstrate the ability to lead and productively participate in group situations via assigning multidisciplinary design projects for specific wastewater unit processes
9. Teaching and Learning Strategies	
Strategy	Interactive theoretical lectures using the whiteboard and modern presentation tools (Data Show). Solving problems and applied examples with student participation to develop critical thinking and problem-solving skills.

	Practical sessions in the laboratory/field and writing technical reports on the experiments. Homework, quizzes and reports, supported by e-learning platforms (Google Classroom).
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10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	Recognize the common physical, chemical and biological unit operation encountered in treatment processes	Introduction, objectives ,general consideration of wastewater treatment plant planning and design	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
2-3	4	Formulate a design of coarse screen and collection pit	Preliminary unit operation: Screening and collection pit	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
4	2	Formulate a design of grit chamber	Design of Grit chamber facilities	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
5	4	Formulate a design of PST	Primary unit operation (PST) Design	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
6-7	4	Recognize the common unit process of biological treatment	Fundamentals of biological treatment	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
8-11	4	Formulate a design of activated sludge units	Design of suspended growth units: Activated sludge processes and modifications	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
12	6	Recognize the common features of trickling filter.	Attached Growth systems: Trickling filter,	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
13	5	Recognize the common features of Simplified Systems of waste water Treatment:	Simplified Systems of waste water Treatment: Aerated lagoons, Stabilization ponds	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion

14-15	5	Formulate a design of grit chamber	Design of disinfection units: Chlorination, Ozonation, UV disinfection	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
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11. Course Evaluation

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

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

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Metcalf & Eddy (2014). Wastewater Engineering: Treatment and Resource Recovery, 5th ed. McGraw-Hill.
Main references (sources)	Davis, M.L. Water and Wastewater Engineering. McGraw-Hill.
Recommended books and references (scientific journals, reports...)	Relevant peer-reviewed scientific journals and lecture notes prepared by the instructor.
Electronic References, Websites	Northern Technical University e-learning platforms (ntu.edu.iq) and Google Classroom; Iraqi Virtual Science Library (ivsl.org); open courseware such as NPTEL and MIT OpenCourseWare.

Course Description Form

1. Course Name:	
Groundwater Hydrology	
2. Course Code:	
EWRT 127	
3. Semester / Year:	
Semester 6 / Third Year – Academic Year 2025-2026	
4. Description Preparation Date:	
2/9/2025	
5. Available Attendance Forms:	
In-person attendance (FACE to FACE) – Language of instruction: English	
6. Number of Credit Hours (Total) / Number of Units (Total)	
Number of units (ECTS): 4 ECTS Weekly hours: 5 hrs (theory 5 + practical 0) Student workload: structured (SSWL) 78 h/sem + unstructured (USSWL) 22 h/sem = 100 h/sem	
7. Course administrator's name (mention all, if more than one name)	
Name: Asst. Prof. Abdullah Ahmed Sheikho Email: Abidallah.shekho@ntu.edu.iq	
8. Course Objectives	
Course Objectives	Course Objectives The groundwater hydrology course is concerned with studying the movement of water in various groundwater reservoirs. After completing the course, the student will be knowledgeable about the following points: - The student's knowledge of the importance of groundwater hydrology. (i) - The student should be able to understand the movement of groundwater and its flow inside wells. (ii) - The student should be able to describe the hydraulic characteristics of groundwater reservoirs. (i) - Knowledge of the fundamental laws and equations to describe groundwater flow processes. (ii) - General knowledge of the types and characteristics of groundwater aquifers. (i) - The student could be able to use software related to groundwater movement (i)
9. Teaching and Learning Strategies	
Strategy	Interactive theoretical lectures using the whiteboard and modern presentation tools (Data Show). Solving problems and applied examples with student participation to develop critical thinking and problem-solving skills. Homework, quizzes and reports, supported by e-learning platforms (Google Classroom).

10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	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 lecture, discussion and problem solving	Quiz, homework, discussion
2-3	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 lecture, discussion and problem solving	Quiz, homework, discussion
5-4	2	Laws of groundwater movement: Darcy's law, hydraulic conductivity, transmissibility. (ii)	Groundwater movement	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
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 lecture, discussion and problem solving	Quiz, homework, discussion
8-11	4	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 lecture, discussion and problem solving	Quiz, homework, discussion
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 lecture, discussion and problem solving	Quiz, homework, discussion
14-15	4	Well drilling - penetration speed, diameter, depth, and vibration level. (i)	Drilling wells	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
11. Course Evaluation					

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

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

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Todd, D.K. & Mays, L.W. (2005). Groundwater Hydrology. Wiley.
Main references (sources)	Fetter, C.W. Applied Hydrogeology. Pearson.
Recommended books and references (scientific journals, reports...)	Relevant peer-reviewed scientific journals and lecture notes prepared by the instructor.
Electronic References, Websites	Northern Technical University e-learning platforms (ntu.edu.iq) and Google Classroom; Iraqi Virtual Science Library (ivsl.org); open courseware such as NPTEL and MIT OpenCourseWare.

Course Description Form

1. Course Name:			
Foundation Engineering			
2. Course Code:			
EWRT 128			
3. Semester / Year:			
Semester 6 / Third Year – Academic Year 2025-2026			
4. Description Preparation Date:			
2/9/2025			
5. Available Attendance Forms:			
In-person attendance (FACE to FACE) – Language of instruction: English			
6. Number of Credit Hours (Total) / Number of Units (Total)			
Number of units (ECTS): 6 ECTS Weekly hours: 5 hrs (theory 3 + practical 2) Student workload: structured (SSWL) 78 h/sem + unstructured (USSWL) 72 h/sem = 150 h/sem			
Workload for Learning & Teaching Activities			
Type of Learning Activity	Activities (# per week)	Duration (h)	Workload (h)
Lecture & In-Class Activities	15	4	45
Preliminary & Further Study	2	1	2
Assignment (Homework)	8	1	8
Project Work	1	5	5
Seminar	3	1	3
Report Writing	3	1	3
Final Exam	1	3	3
Preparation for the Final Exam	1	20	20
Mid-Term Exam	1	2	2
Preparation for the Mid-Term Exam	1	15	15
Short Exam	8	1	8
Preparation for the Short Exam	8	1	8
TOTAL	52	55	122
Total Workload of the Course Unit			122
Workload (h) / 25			4.9
ECTS Credits allocated for the Course Unit			5
7. Course administrator's name (mention all, if more than one name)			

Name: Asst. Prof. Dr. Abdalnaser Kashmoola

Email: —

8. Course Objectives

Course Objectives	Course Objectives The student will learn the basic of foundation engineering, soil investigation, calculation of bearing capacity of soil, selection and design of different types of foundation.
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9. Teaching and Learning Strategies

Strategy	Interactive theoretical lectures using the whiteboard and modern presentation tools (Data Show). Solving problems and applied examples with student participation to develop critical thinking and problem-solving skills. Practical sessions in the laboratory/field and writing technical reports on the experiments. Homework, quizzes and reports, supported by e-learning platforms (Google Classroom).
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10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1, 2, 3	5	Student understands and applies the material	Demonstrates knowledge of the Soil investigation – Demonstrates knowledge of the Methods of exploration – auguring and boring – Wash boring and rotary drilling – Depth of boring – Spacing of borehole – Demonstrates knowledge of the Sampling techniques – Representative and undisturbed sampling – methods – Split spoon sampler, Thin wall sampler.	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
4,5	5	Student understands and applies the material	Demonstrates knowledge of the Penetration tests (SPT and SCPT) – Bore log report – Able to interpret Data– and determine strength parameters – Able to select the foundation based on soil condition. Able to conduct the Laboratory tests, and Report writing	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion

6,7,8,9	5	Student understands and applies the material	Demonstrates knowledge of the Bearing capacity theories, Demonstrates knowledge of the Factors affecting bearing capacity Demonstrates knowledge of the Bearing capacity from in-situ tests (SPT, SCPT and plate load)	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
10,11,12	5	Student understands and applies the material	Demonstrates knowledge of the Determination of Settlement of shallow foundations on granular and clay deposits – Demonstrates knowledge of the Total and differential settlement – Allowable settlements.	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
13,14	5	Student understands and applies the material	Demonstrates knowledge of the Footing and rafts: Demonstrates knowledge of the Types of footings – Demonstrates knowledge of the Contact pressure distribution: Isolated footing – Combined footings – Demonstrates knowledge of the Types and proportioning – Demonstrates knowledge of the Mat foundation – Types and applications – Proportioning – Demonstrates knowledge of the Floating foundation	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion

11. Course Evaluation

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

Evaluation type	Mark
Quizzes	10
Homework and reports	10
Attendance, participation and class activities	10
Mid-term examination	20
Final examination	50
Total	100

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Das, B.M. Principles of Foundation Engineering. Cengage.
Main references (sources)	Bowles, J.E. Foundation Analysis and Design. McGraw-Hill.
Recommended books and references (scientific journals, reports...)	Relevant peer-reviewed scientific journals and lecture notes prepared by the instructor.
Electronic References, Websites	Northern Technical University e-learning platforms (ntu.edu.iq) and Google Classroom; Iraqi Virtual Science Library (ivsl.org); open courseware such as NPTEL and MIT OpenCourseWare.

Course Descriptions – Fourth Year

Course Description Form

1. Course Name:	
Design of Water Treatment Plants	
2. Course Code:	
EWRT 129	
3. Semester / Year:	
Semester 7 / Fourth Year – Academic Year 2025-2026	
4. Description Preparation Date:	
2/9/2025	
5. Available Attendance Forms:	
In-person attendance (FACE to FACE) – Language of instruction: English	
6. Number of Credit Hours (Total) / Number of Units (Total)	
Number of units (ECTS): 6 ECTS Weekly hours: 4 hrs (theory 2 + practical 2) Student workload: structured (SSWL) 63 h/sem + unstructured (USSWL) 87 h/sem = 150 h/sem	
7. Course administrator's name (mention all, if more than one name)	
Name: Alaa Imad Hamid Email: —	
8. Course Objectives	
Course Objectives	Course Objectives Learn some specific and advance methods in drinking water treatment ☐ Learn methods used to treat the residuals from drinking water treatment plants. Course Objectives Teaching and Learning Strategies Course Objectives This course has several components that include power point lectures, individual & group assignments, field visits and e-learning platforms. Exercises involving the use of computer applications tools to understand specific unit processes
9. Teaching and Learning Strategies	
Strategy	Interactive theoretical lectures using the whiteboard and modern presentation tools (Data Show). Solving problems and applied examples with student participation to develop critical thinking and problem-solving skills. Practical sessions in the laboratory/field and writing technical reports on the experiments.

	Homework, quizzes and reports, supported by e-learning platforms (Google Classroom).
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10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1-2	4	Student understands and applies the material	Chemical precipitation	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
3-4	4	Student understands and applies the material	Ion exchange	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
5-7	6	Student understands and applies the material	Reverse Osmosis	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
8-9	4	Student understands and applies the material	Electrical dialyzes	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
10-15	12	Student understands and applies the material	Drinking Water Treatment plant residual management	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion

11. Course Evaluation

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

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

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Crittenden, J.C. et al. (MWH) (2012). Water Treatment: Principles and Design. Wiley.
Main references (sources)	Davis, M.L. Water and Wastewater Engineering. McGraw-Hill.

Recommended books and references (scientific journals, reports...)	Relevant peer-reviewed scientific journals and lecture notes prepared by the instructor.
Electronic References, Websites	Northern Technical University e-learning platforms (ntu.edu.iq) and Google Classroom; Iraqi Virtual Science Library (ivsl.org); open courseware such as NPTEL and MIT OpenCourseWare.

Course Description Form

1. Course Name:	
Design of Hydraulic Structures I	
2. Course Code:	
EWRT 130	
3. Semester / Year:	
Semester 7 / Fourth Year – Academic Year 2025-2026	
4. Description Preparation Date:	
2/9/2025	
5. Available Attendance Forms:	
In-person attendance (FACE to FACE) – Language of instruction: English	
6. Number of Credit Hours (Total) / Number of Units (Total)	
Number of units (ECTS): 6 ECTS Weekly hours: 5 hrs (theory 3 + practical 2) Student workload: structured (SSWL) 78 h/sem + unstructured (USSWL) 72 h/sem = 150 h/sem	
7. Course administrator's name (mention all, if more than one name)	
Name: Asst. Prof. Dr. Abdalnaser Kashmoola Email: —	
8. Course Objectives	
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 Course Objectives Teaching and Learning Strategies Course Objectives 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
9. Teaching and Learning Strategies	

Strategy	Interactive theoretical lectures using the whiteboard and modern presentation tools (Data Show). Solving problems and applied examples with student participation to develop critical thinking and problem-solving skills. Practical sessions in the laboratory/field and writing technical reports on the experiments. Homework, quizzes and reports, supported by e-learning platforms (Google Classroom).
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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	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
2-5	16	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	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
6	4	Recognize the components of Protection works of approaches for horizontal floor	Protection works of approaches for horizontal floor	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
7-10	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)	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
11-14	16	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	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion

15	4	Demonstrate the ability to lead and productively participate in group situations by assigning multidisciplinary design projects for some hydraulic structures	design and apply the example of the cross and head regulator + General Revision	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
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11. Course Evaluation

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

Evaluation type	Degree
quizzes 2	10
Homework 2	10
Term exam	20
Final exam	60
Total 100	100

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Novak, P. et al. Hydraulic Structures. CRC Press.
Main references (sources)	U.S. Bureau of Reclamation. Design of Small Dams.
Recommended books and references (scientific journals, reports...)	Relevant peer-reviewed scientific journals and lecture notes prepared by the instructor.
Electronic References, Websites	Northern Technical University e-learning platforms (ntu.edu.iq) and Google Classroom; Iraqi Virtual Science Library (ivsl.org); open courseware such as NPTEL and MIT OpenCourseWare.

Course Description Form

1. Course Name:					
Soil and Ground Water Pollution					
2. Course Code:					
EWRT 131					
3. Semester / Year:					
Semester 7 / Fourth Year – Academic Year 2025-2026					
4. Description Preparation Date:					
2/9/2025					
5. Available Attendance Forms:					
In-person attendance (FACE to FACE) – Language of instruction: English					
6. Number of Credit Hours (Total) / Number of Units (Total)					
Number of units (ECTS): 6 ECTS Weekly hours: 4 hrs (theory 4 + practical 0) Student workload: structured (SSWL) 63 h/sem + unstructured (USSWL) 87 h/sem = 150 h/sem					
7. Course administrator's name (mention all, if more than one name)					
Name: Asst. Prof. Dr. Maha Mohamed Taha Hassan Email: maha.mohammed@ntu.edu.iq					
8. Course Objectives					
Course Objectives		Course Objectives Understand various pollutants such as heavy metals, pesticides, and hydrocarbons, and their origins. Learn how pollutants move through soil and groundwater, including physical, chemical, and biological processes. Develop skills to evaluate the environmental and health risks associated with soil and groundwater contamination.			
9. Teaching and Learning Strategies					
Strategy		Provide foundational knowledge through detailed lectures on pollution sources, transport mechanisms, and remediation technologies Conduct site visits to contaminated locations for hands- experience with soil and water sampling techniques. Allow students to analyze samples in the lab, testing for various pollutants and understanding their properties.			
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method

1	4	Student understands and applies the material	Overview of soil and groundwater pollution	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
2-5	16	Student understands and applies the material	Physical, chemical, and biological processes affecting pollutant transport	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
6	4	Student understands and applies the material	Techniques for site investigation (e.g., sampling, drilling, coring)	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
7	4	Student understands and applies the material	Concepts of risk assessment	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
8-10	8	Student understands and applies the material	Source-pathway-receptor analysis	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
11	4	Student understands and applies the material	Physical, chemical, and biological remediation methods	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
12	4	Student understands and applies the material	Case studies of remediation projects	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
13	4	Student understands and applies the material	Overview of local, national, and international regulations	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
14	4	Student understands and applies the material	Standards for soil and groundwater quality	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
15	4	Student understands and applies the material	Analysis of real-world case studies	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion

11. Course Evaluation

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

Evaluation type	Degree
quizzes 2	10
Homework 2	10
Term exam	20
Final exam	60

Total 100	100
12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Fetter, C.W. Contaminant Hydrogeology. Waveland Press.
Main references (sources)	Sharma, H.D. & Reddy, K.R. Geoenvironmental Engineering. Wiley.
Recommended books and references (scientific journals, reports...)	Relevant peer-reviewed scientific journals and lecture notes prepared by the instructor.
Electronic References, Websites	Northern Technical University e-learning platforms (ntu.edu.iq) and Google Classroom; Iraqi Virtual Science Library (ivsl.org); open courseware such as NPTEL and MIT OpenCourseWare.

Course Description Form

1. Course Name:	
Open Channels	
2. Course Code:	
EWRT 132	
3. Semester / Year:	
Semester 7 / Fourth Year – Academic Year 2025-2026	
4. Description Preparation Date:	
2/9/2025	
5. Available Attendance Forms:	
In-person attendance (FACE to FACE) – Language of instruction: English	
6. Number of Credit Hours (Total) / Number of Units (Total)	
Number of units (ECTS): 5 ECTS Weekly hours: 5 hrs (theory 3 + practical 2) Student workload: structured (SSWL) 78 h/sem + unstructured (USSWL) 47 h/sem = 125 h/sem	
7. Course administrator's name (mention all, if more than one name)	
Name: Asst. Prof. Dr. Abdalnaser Kashmoola Email: —	
8. Course Objectives	
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 the connect each other and define the main requirements to design the right one Course Objectives Teaching and Learning Strategies Course Objectives 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.
9. Teaching and Learning Strategies	

Strategy	Interactive theoretical lectures using the whiteboard and modern presentation tools (Data Show). Solving problems and applied examples with student participation to develop critical thinking and problem-solving skills. Practical sessions in the laboratory/field and writing technical reports on the experiments. Homework, quizzes and reports, supported by e-learning platforms (Google Classroom).
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10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	Student understands and applies the material	Open channel, types and classifications.	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
2	4	Student understands and applies the material	Uniform flow, Chezy and Manning equations.	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
3	4	Student understands and applies the material	Best hydraulic cross section	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
4-5	8	Student understands and applies the material	Consecration of hydraulic radius and Manning coefficient	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
6	4	Student understands and applies the material	Specific energy and critical	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
7	4	Student understands and applies the material	Critical depth with jump or contractions Critical depth with jump or contraction	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
8-9	8	Student understands and applies the material	Hydraulic jump	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
10	4	Student understands and applies the material	Varied flow	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion

11	4	Student understands and applies the material	water surface profile	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
12	4	Student understands and applies the material	Weirs and notches	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
13	4	Student understands and applies the material	Second monthly exam	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
14-15	8	Student understands and applies the material	Preparatory week before the final Exam	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion

11. Course Evaluation

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

Evaluation type	Degree
quizzes 2	10
Homework 2	10
Term exam	20
Final exam	60
Total 100	100

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Chow, V.T. (1959). Open-Channel Hydraulics. McGraw-Hill.
Main references (sources)	Chaudhry, M.H. Open-Channel Flow. Springer.
Recommended books and references (scientific journals, reports...)	Relevant peer-reviewed scientific journals and lecture notes prepared by the instructor.
Electronic References, Websites	Northern Technical University e-learning platforms (ntu.edu.iq) and Google Classroom; Iraqi Virtual Science Library (ivsl.org); open courseware such as NPTEL and MIT OpenCourseWare.

Course Description Form

1. Course Name:	
Design of Gravity Irrigation Systems	
2. Course Code:	
EWRT 133	
3. Semester / Year:	
Semester 7 / Fourth Year – Academic Year 2025-2026	
4. Description Preparation Date:	
2/9/2025	
5. Available Attendance Forms:	
In-person attendance (FACE to FACE) – Language of instruction: English	
6. Number of Credit Hours (Total) / Number of Units (Total)	
Number of units (ECTS): 4 ECTS Weekly hours: 3 hrs (theory 3 + practical 0) Student workload: structured (SSWL) 48 h/sem + unstructured (USSWL) 52 h/sem = 100 h/sem	
7. Course administrator's name (mention all, if more than one name)	
Name: Asst. Prof. Dr. Mohammad Akram Saadi Ayoub Al-Dabbagh Email: mohamed.akram@ntu.edu.iq	
8. Course Objectives	
Course Objectives	Course Objectives 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) Course Objectives Teaching and Learning Strategies Course Objectives lectures and Presentations: Provide foundational knowledge through lectures, covering key concepts, theories, and case studies related to gravity irrigation systems. Hands- Laboratory Work: Include practical sessions where students can set up and operate small-scale gravity irrigation models, analyze water flow, and measure efficiency. Field Trips: Organize visits to farms or agricultural sites that use gravity irrigation systems to give students real-world exposure and practical insights.

9. Teaching and Learning Strategies

Strategy	Interactive theoretical lectures using the whiteboard and modern presentation tools (Data Show). Solving problems and applied examples with student participation to develop critical thinking and problem-solving skills. Homework, quizzes and reports, supported by e-learning platforms (Google Classroom).
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10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	Student understands and applies the material	Introduction to the farm irrigation and the basics of system	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
2	4	Student understands and applies the material	Basic design Factors/Consumptive use/Soil/Irrigation interval and water application depth	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
3	4	Student understands and applies the material	Efficiency ,adequacy ,and uniformity of irrigation	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
4	4	Student understands and applies the material	Water infiltration into soil	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
5	4	Student understands and applies the material	Land grading/Description ,criteria ,and preparatory steps/ Design of land grading/Slopes and field levels	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
6	4	Student understands and applies the material	Earthwork balance and earthwork calculations	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
7	4	Student understands and applies the material	Surface irrigation/Mechanism of surface irrigation process/Infiltration opportunity time and application depth	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
8	4	Student understands and applies the material	Water balance concept in surface irrigation	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion

9	4	Student understands and applies the material	Border irrigation system/Assumptions ,considerations ,and limitations of design/Miscellaneous notes	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
10	4	Student understands and applies the material	Design flow rate/Flow depth/Maximum border length/Borde	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
11	4	Student understands and applies the material	Furrow irrigation/Furrow intake characteristics/ Considerations, assumptions, limitations, and design equations	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
12	4	Student understands and applies the material	Runoff control techniques	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
13	4	Student understands and applies the material	Cutback irrigation, Runoff recovery system	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
14	4	Student understands and applies the material	Basin irrigation/ Considerations, assumptions, limitations, and design equations/Booher method	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
15	4	Student understands and applies the material	Final Exam Exam	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion

11. Course Evaluation

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

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

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Walker, W.R. & Skogerboe, G.V. Surface Irrigation: Theory and Practice. Prentice Hall.
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Main references (sources)	FAO Irrigation and Drainage Paper No. 56: Crop Evapotranspiration.
Recommended books and references (scientific journals, reports...)	Relevant peer-reviewed scientific journals and lecture notes prepared by the instructor.
Electronic References, Websites	Northern Technical University e-learning platforms (ntu.edu.iq) and Google Classroom; Iraqi Virtual Science Library (ivsl.org); open courseware such as NPTEL and MIT OpenCourseWare.

Course Description Form

1. Course Name:			
Engineering Project I			
2. Course Code:			
EWRT 134			
3. Semester / Year:			
Semester 7 / Fourth Year – Academic Year 2025-2026			
4. Description Preparation Date:			
2/9/2025			
5. Available Attendance Forms:			
In-person attendance (FACE to FACE) – Language of instruction: English			
6. Number of Credit Hours (Total) / Number of Units (Total)			
Number of units (ECTS): 3 ECTS Weekly hours: 2 hrs (theory 2 + practical 0) Student workload: structured (SSWL) 33 h/sem + unstructured (USSWL) 42 h/sem = 75 h/sem			
Workload for Learning & Teaching Activities			
Type of Learning Activity	Activities (# per week)	Duration (h)	Workload (h)
Group Work	15	1	15
Laboratory	15	1	15
Project Work	1	5	5
Seminar	1	1	1
Web Based Learning	4	1	4
Practice at a workplace	14	1	14
Thesis Work	1	8	8
Report Writing	1	5	5
Final Exam	1	1	1
Preparation for the Final Exam	1	4	4
Mid-Term Exam	1	1	1
Preparation for the Mid-Term Exam	1	2	2
TOTAL	56	31	75
Total Workload of the Course Unit			75
Workload (h) / 25			3
ECTS Credits allocated for the Course Unit			3
7. Course administrator's name (mention all, if more than one name)			

Name: Lect. Ahmed Azhar Thanoun
Email: ahmedalnamey@ntu.edu.iq

8. Course Objectives

Course Objectives	Course Objectives The student will be able to design, calculate quantities, and plot the architectural, constructional, sanitary, & electrical plans & details for a certain project in civil engineering.
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9. Teaching and Learning Strategies

Strategy	Direct supervision and weekly follow-up of the project teams. Project-based learning addressing real engineering problems. Training students in literature search, technical report writing, presentation and discussion.
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10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1-14	2	Student understands and applies the material	Different project subjects supervised by teaching staff such as: Thermal insulation and consideration of walls. Ventilation strategy of buildings. Acoustic noise (isolation) of wall and ceiling.	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion

11. Course Evaluation

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

Evaluation type	Mark
Weekly follow-up and progress	20
Seminar / progress presentation	10
Project report	20
Final defence before the committee	50
Total	100

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Scientific references specific to each project topic, as directed by the supervisor.
Main references (sources)	The approved college guide for writing graduation projects.
Recommended books and references (scientific journals, reports...)	Relevant peer-reviewed scientific journals and lecture notes prepared by the instructor.

Electronic References, Websites	Northern Technical University e-learning platforms (ntu.edu.iq) and Google Classroom; Iraqi Virtual Science Library (ivsl.org); open courseware such as NPTEL and MIT OpenCourseWare.
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Course Description Form

1. Course Name:	
Engineering Project Management and Economy	
2. Course Code:	
EWRT 135	
3. Semester / Year:	
Semester 8 / Fourth Year – Academic Year 2025-2026	
4. Description Preparation Date:	
2/9/2025	
5. Available Attendance Forms:	
In-person attendance (FACE to FACE) – Language of instruction: English	
6. Number of Credit Hours (Total) / Number of Units (Total)	
Number of units (ECTS): 5 ECTS Weekly hours: 4 hrs (theory 4 + practical 0) Student workload: structured (SSWL) 63 h/sem + unstructured (USSWL) 62 h/sem = 125 h/sem	
7. Course administrator's name (mention all, if more than one name)	
Name: Asst. Prof. Dr. Abdalnaser Kashmoola Email: —	
8. Course Objectives	
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) Course Objectives 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.
9. Teaching and Learning Strategies	
Strategy	Interactive theoretical lectures using the whiteboard and modern presentation tools (Data Show). Solving problems and applied examples with student participation to develop critical thinking and problem-solving skills. Homework, quizzes and reports, supported by e-learning platforms (Google Classroom).

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	Student understands and applies the material	Water Resources Economy Principles of Engineering Economics Cash Flow Diagram (i)	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
2-3	8	Student understands and applies the material	Uniform Annual Series Uniform Gradient Series Nominal and Effective Interest Rates (i) Payback Period: Simple Payback – Discounted payback	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
4-5	8	Student understands and applies the material	Present Worth (PW) Method (ii)	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
6-7	8	Student understands and applies the material	Future Worth (FW) Method	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
8-10	12	Student understands and applies the material	Annual Worth (AW) Method (ii)	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
11	4	Student understands and applies the material	Benefit/Cost Ratio Method (ii)	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
12-15	16	Student understands and applies the material	Project Pricing. Progress Payments.Cash Flow Forecasting(i)	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion

11. Course Evaluation

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

Evaluation type	Degree
First monthly exam	20
Second monthly exam	20
Final exam	60
Total 100	100

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	James, L.D. & Lee, R.R. Economics of Water Resources Planning. McGraw-Hill.
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Main references (sources)	PMI. A Guide to the Project Management Body of Knowledge (PMBOK Guide).
Recommended books and references (scientific journals, reports...)	Relevant peer-reviewed scientific journals and lecture notes prepared by the instructor.
Electronic References, Websites	Northern Technical University e-learning platforms (ntu.edu.iq) and Google Classroom; Iraqi Virtual Science Library (ivsl.org); open courseware such as NPTEL and MIT OpenCourseWare.

Course Description Form

1. Course Name:	
Design of Irrigation and Drainage Networks	
2. Course Code:	
EWRT 136	
3. Semester / Year:	
Semester 8 / Fourth Year – Academic Year 2025-2026	
4. Description Preparation Date:	
2/9/2025	
5. Available Attendance Forms:	
In-person attendance (FACE to FACE) – Language of instruction: English	
6. Number of Credit Hours (Total) / Number of Units (Total)	
Number of units (ECTS): 5 ECTS Weekly hours: 4 hrs (theory 4 + practical 0) Student workload: structured (SSWL) 63 h/sem + unstructured (USSWL) 62 h/sem = 125 h/sem	
7. Course administrator's name (mention all, if more than one name)	
Name: Alaa Imad Hamid Email: —	
8. Course Objectives	
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 Course Objectives Teaching and Learning Strategies Course Objectives 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.
9. Teaching and Learning Strategies	
Strategy	Interactive theoretical lectures using the whiteboard and modern presentation tools (Data Show). Solving problems and applied examples with student participation to develop critical thinking and problem-solving skills.

Homework, quizzes and reports, supported by e-learning platforms (Google Classroom).

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	Student understands and applies the material	Learn about Naming and numbering	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
2	4	Student understands and applies the material	irrigation and drainage networks	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
3	4	Student understands and applies the material	Learn layout of irrigation and drainage networks on contour maps	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
4-5	8	Student understands and applies the material	Learn water supply systems	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
6-7	8	Student understands and applies the material	Learn calculating Discharge for different Irrigation systems	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
8-9	8	Student understands and applies the material	Learn design of earth Canal using general Design method	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
10	4	Student understands and applies the material	Learn drawing ground Profiles for canal networks	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
11	4	Student understands and applies the material	Learn drawing ground Profiles for drainage networks	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
12	4	Student understands and applies the material	Learn drawing the Synoptic diagram For canals	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
13	4	Student understands and applies the material	Learn drawing ground Profiles for drain networks	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
14	4	Student understands and applies the material	Learn drawing the Synoptic diagram For drains	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion

15	4	Student understands and applies the material	Final Exam Exam	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
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11. Course Evaluation

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

Evaluation type	Degree
First monthly exam	20
Second monthly exam	20
Final exam	60
Total 100	100

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Garg, S.K. Irrigation Engineering and Hydraulic Structures. Khanna Publishers.
Main references (sources)	Ritzema, H.P. (ed.) Drainage Principles and Applications. ILRI.
Recommended books and references (scientific journals, reports...)	Relevant peer-reviewed scientific journals and lecture notes prepared by the instructor.
Electronic References, Websites	Northern Technical University e-learning platforms (ntu.edu.iq) and Google Classroom; Iraqi Virtual Science Library (ivsl.org); open courseware such as NPTEL and MIT OpenCourseWare.

Course Description Form

1. Course Name:	
Design of Sprinkler and Drip Irrigation Systems	
2. Course Code:	
EWRT 137	
3. Semester / Year:	
Semester 8 / Fourth Year – Academic Year 2025-2026	
4. Description Preparation Date:	
2/9/2025	
5. Available Attendance Forms:	
In-person attendance (FACE to FACE) – Language of instruction: English	
6. Number of Credit Hours (Total) / Number of Units (Total)	
Number of units (ECTS): 7 ECTS Weekly hours: 6 hrs (theory 4 + practical 2) Student workload: structured (SSWL) 93 h/sem + unstructured (USSWL) 82 h/sem = 175 h/sem	
7. Course administrator's name (mention all, if more than one name)	
Name: Asst. Prof. Abdullah Ahmed Sheikho Email: Abidallah.shekho@ntu.edu.iq	
8. Course Objectives	
Course Objectives	Course Objectives 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 the 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, (v) Course Objectives Teaching and Learning Strategies Course Objectives Lectures and Presentations: Deliver lectures covering the principles, components, and design criteria of sprinkler and drip irrigation systems. Hands-on Workshops: Conduct workshops where students can design and assemble small-scale sprinkler and drip systems, learning about component integration and system performance. Field Visits: Arrange trips to sites employing advanced sprinkler and drip irrigation systems for practical observation and understanding.
9. Teaching and Learning Strategies	

Strategy	Interactive theoretical lectures using the whiteboard and modern presentation tools (Data Show). Solving problems and applied examples with student participation to develop critical thinking and problem-solving skills. Practical sessions in the laboratory/field and writing technical reports on the experiments. Homework, quizzes and reports, supported by e-learning platforms (Google Classroom).
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10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	Student understands and applies the material	Sprinkler irrigation Sprinkler irrigation basic concept Advantages and problems of sprinkler irrigation Basic and supplementary components Types of sprinkler irrigation systems	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
2	4	Student understands and applies the material	Fundamentals of sprinkler irrigation Single sprinkler water distribution Layout of stationary system/Hydraulic of sprinkler nozzle	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
3	4	Student understands and applies the material	Uniformity of sprinkler water distribution	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
4	4	Student understands and applies the material	Alternate setting of sprinkler laterals Sprinkler spray losses sprinkler irrigation efficiency	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
5	4	Student understands and applies the material	Sprinkler lateral pipes Fundamentals of flow hydraulic pipes Allowable pressure variation /Sprinkler pipe size	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
6	4	Student understands and applies the material	Friction head loss/Layout of sprinkler pipes Moving and operation sprinkler pipes Sprinkler pipe material	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion

7	4	Student understands and applies the material	Sprinkler irrigation major pipes distribution system Types of major pipes distribution system Design requirements/ Distribution system layout	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
8	4	Student understands and applies the material	Design methods (flow velocity method, allowable friction method, economic analysis method)	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
9	4	Student understands and applies the material	Economic analysis general procedure Total dynamic head	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
10	4	Student understands and applies the material	Applications on design of main pipe systems	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
11	4	Student understands and applies the material	Trickle irrigation Advantages and problems of drip irrigation Trickle system basic component Soil-water-crop factor	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
12	4	Student understands and applies the material	Emitters selection/Hydraulic of trickle network	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
13	4	Student understands and applies the material	General notes about evaluation of on- farm irrigation systems	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
14	4	Student understands and applies the material	Applications of Drip Irrigations	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
15	4	Student understands and applies the material	Final Exam	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion

11. Course Evaluation

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

Evaluation type	Degree
Four Exams, (each 3pt)	12
Midterm Exam	20
Homework	8
Final exam	60
Total 100	100
12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Keller, J. & Bliesner, R.D. (1990). Sprinkle and Trickle Irrigation. Van Nostrand Reinhold.
Main references (sources)	FAO Irrigation and Drainage Paper No. 36: Localized Irrigation.
Recommended books and references (scientific journals, reports...)	Relevant peer-reviewed scientific journals and lecture notes prepared by the instructor.
Electronic References, Websites	Northern Technical University e-learning platforms (ntu.edu.iq) and Google Classroom; Iraqi Virtual Science Library (ivsl.org); open courseware such as NPTEL and MIT OpenCourseWare.

Course Description Form

1. Course Name:					
Design of Hydraulic Structures II					
2. Course Code:					
EWRT 138					
3. Semester / Year:					
Semester 8 / Fourth Year – Academic Year 2025-2026					
4. Description Preparation Date:					
2/9/2025					
5. Available Attendance Forms:					
In-person attendance (FACE to FACE) – Language of instruction: English					
6. Number of Credit Hours (Total) / Number of Units (Total)					
Number of units (ECTS): 5 ECTS Weekly hours: 4 hrs (theory 3 + practical 1) Student workload: structured (SSWL) 63 h/sem + unstructured (USSWL) 62 h/sem = 125 h/sem					
7. Course administrator's name (mention all, if more than one name)					
Name: Asst. Prof. Dr. Adnan Abdul Wahab Ismail Email: adnan.ismael@ntu.edu.iq					
8. Course Objectives					
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 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

1-5	20	Student understands and applies the material	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).	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
6-7	8	Student understands and applies the material	Develop the ability of the students to solve the design problems and analyze the data to evaluate some types of flow transition	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
8-10	12	Student understands and applies the material	Develop the ability of the students to solve design problems and analyze the data to evaluate the cross drainage works, (Design example of syphon).	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
11-14	16	Student understands and applies the material	Develop the ability of the students to solve the design of the culvert	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
15	4	Student understands and applies the material	Develop and solve the design of the canal falls (Sharda-type fall).	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion

11. Course Evaluation

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

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

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Novak, P. et al. Hydraulic Structures. CRC Press.
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Main references (sources)	Garg, S.K. Irrigation Engineering and Hydraulic Structures. Khanna Publishers.
Recommended books and references (scientific journals, reports...)	Relevant peer-reviewed scientific journals and lecture notes prepared by the instructor.
Electronic References, Websites	Northern Technical University e-learning platforms (ntu.edu.iq) and Google Classroom; Iraqi Virtual Science Library (ivsl.org); open courseware such as NPTEL and MIT OpenCourseWare.

Course Description Form

1. Course Name:	
Estimation and Specifications	
2. Course Code:	
EWRT 139	
3. Semester / Year:	
Semester 8 / Fourth Year – Academic Year 2025-2026	
4. Description Preparation Date:	
2/9/2025	
5. Available Attendance Forms:	
In-person attendance (FACE to FACE) – Language of instruction: English	
6. Number of Credit Hours (Total) / Number of Units (Total)	
Number of units (ECTS): 5 ECTS Weekly hours: 4 hrs (theory 3 + practical 1) Student workload: structured (SSWL) 63 h/sem + unstructured (USSWL) 62 h/sem = 125 h/sem	
7. Course administrator's name (mention all, if more than one name)	
Name: Asst. Prof. Dr. Mohammad Akram Saadi Ayoub Al-Dabbagh Email: mohamed.akram@ntu.edu.iq	
8. Course Objectives	
Course Objectives	Course Objectives 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	Student understands and applies the material	Introduction to Estimation and Materials Specification, Introduction; syllabus; Draw (house plan).	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
2	3	Student understands and applies the material	Excavation of Foundations Excavation of stripe and raft foundation, draw (elevations, sectional elevation, foundation plan, wall section).	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
3-4	6	Student understands and applies the material	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 lecture + practical, discussion and problem solving	Quiz, homework, discussion
5	3	Student understands and applies the material	Cubed wall works Cubed wall works and estimation of materials	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
6-8	9	Student understands and applies the material	Walls stone building, bricks building, block building. Bricks building estimation of materials Block building, estimation of materials	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
9-10	6	Student understands and applies the material	Wood form works estimation of materials for wood form types	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
11	3	Student understands and applies the material	Design of drains' sections	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion

12-13	6	Student understands and applies the material	Reinforced estimation of materials for reinforced of slab. Reinforced of beams estimation of materials for reinforced of beams, draw (reinforced of Structural construction	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion
14-15	6	Student understands and applies the material	Finishing works Estimation of materials for finishing works	Theoretical lecture + practical, discussion and problem solving	Quiz, homework, discussion

11. Course Evaluation

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

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

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Dutta, B.N. Estimating and Costing in Civil Engineering. UBS Publishers.
Main references (sources)	Iraqi technical specifications for civil works and approved bills of quantities.
Recommended books and references (scientific journals, reports...)	Relevant peer-reviewed scientific journals and lecture notes prepared by the instructor.
Electronic References, Websites	Northern Technical University e-learning platforms (ntu.edu.iq) and Google Classroom; Iraqi Virtual Science Library (ivsl.org); open courseware such as NPTEL and MIT OpenCourseWare.

Course Description Form

1. Course Name:			
Engineering Project 2			
2. Course Code:			
EWRT 140			
3. Semester / Year:			
Semester 8 / Fourth Year – Academic Year 2025-2026			
4. Description Preparation Date:			
2/9/2025			
5. Available Attendance Forms:			
In-person attendance (FACE to FACE) – Language of instruction: English			
6. Number of Credit Hours (Total) / Number of Units (Total)			
Number of units (ECTS): 3 ECTS Weekly hours: 2 hrs (theory 2 + practical 0) Student workload: structured (SSWL) 33 h/sem + unstructured (USSWL) 42 h/sem = 75 h/sem			
Workload for Learning & Teaching Activities			
Type of Learning Activity	Activities (# per week)	Duration (h)	Workload (h)
Project Work	1	10	10
Seminar	1	5	5
Technical Visit	14	1	14
Practice at a workplace	14	2	28
Thesis Work	1	5	5
Report Writing	1	1	1
TOTAL	32	24	63
Total Workload of the Course Unit			63
Workload (h) / 27			2.3
ECTS Credits allocated for the Course Unit			2
7. Course administrator's name (mention all, if more than one name)			
Name: Alaa Imad Hamid Email: —			
8. Course Objectives			
Course Objectives	Course Objectives The student will be able to design, calculate quantities, plot the architectural, constructional, sanitary, & electrical plans & details for a certain project in civil engineering.		

9. Teaching and Learning Strategies					
Strategy		Direct supervision and weekly follow-up of the project teams. Project-based learning addressing real engineering problems. Training students in literature search, technical report writing, presentation and discussion.			
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1-14	2	Student understands and applies the material	Different projects supervised by staff members.	Theoretical lecture, discussion and problem solving	Quiz, homework, discussion
11. Course Evaluation					
Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports etc					
Evaluation type			Mark		
Weekly follow-up and progress			20		
Seminar / progress presentation			10		
Project report			20		
Final defence before the committee			50		
Total			100		
12. Learning and Teaching Resources					
Required textbooks (curricular books, if any)			Scientific references specific to each project topic, as directed by the supervisor.		
Main references (sources)			The approved college guide for writing graduation projects.		
Recommended books and references (scientific journals, reports...)			Relevant peer-reviewed scientific journals and lecture notes prepared by the instructor.		
Electronic References, Websites			Northern Technical University e-learning platforms (ntu.edu.iq) and Google Classroom; Iraqi Virtual Science Library (ivsl.org); open courseware such as NPTEL and MIT OpenCourseWare.		