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

Academic Program Specification Form For Colleges and Institutions

University : Northern Technical University

College : polytechnic college / Mosul

Department : Environmental engineering and water resources technologies

Date of Form Completion: 10 / 4/ 2026

Hass

Dean's Assistant For Scientific Affairs

Date: 10/4/2026

Dr.Maha Mohammad Taha

Head of Department

Date: 10/4/2026

A.N

Dr. Abdulnaser Abdulrazzaq Ahmed

Dean

Date: 11/4/2026

Quality assurance Performance Manager

Date: 10/4/2026

Vision Statement

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.

Mission Statement

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.

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.

3- 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.

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

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

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

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

Program Goals

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.

Preparing cadres in the field of environmental technologies with a solid theoretical and practical background that qualifies them to practice their effective specialties.

Producing scientific and applied research within the department's specialization for the purpose of solving pollution problems.

1. Academic Staff

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.

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

Technical and administrative staff					
Current Position	Specialization	Title	Certificate	Full Name	Sequence
Polytechnic College/ Mosul	Office Management	Senior Technical Manager	Diploma	Asmaa Ibrahim Shaker	1
Polytechnic College/ Mosul	Mechanics	Senior Technical	Diploma	Esmat Arif Mohamed	2
Polytechnic College/ Mosul	Water Resources	Chief Engineer	Bachelor's	Omar Shaaban Hassan	3
Polytechnic College/ Mosul	Computer Science	Programmer	Bachelor's	Safa Abdel Moheb Abdel Qader	4
Polytechnic College/ Mosul	Water Resources	Assistant Engineer	Bachelor's	Marwa Khairy Maged	5
Polytechnic College/ Mosul	Building and Construction Technology	Engineer Technical	Bachelor's	Mina Talat Hussein	6
Polytechnic College/ Mosul	Building and Construction	Chief Technical Trainers	Diploma	Alaa Ahmed Ayoub Abdul	7
Polytechnic College/ Mosul	Agriculture/Horticulture and Gardens	Assistant Chief Agriculture Engineer	Bachelor's	Mohamed Abdel Mohsen Sheet	8
Polytechnic College/ Mosul	English Language	Translator	Bachelor's	Kanaan Shaaban Abd	9

2. Credits, Grading and GPA

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:

GRADING SCHEME مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings

	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	FX – Fail	راسب - قيد المعالجة	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required
Note:				
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)

1. 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:

CGPA = [(1st ᵐodule score x ECTS) + (2nd ᵐodule score x ECTS) + ……] / 240

3. Curriculum/Modules

Semester 1 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
EWRT 100	Soil Physics	63	87	6	B	
EWRT 101	Environmental Chemistry	63	37	4	B	
EWRT 102	ENGINEERING MECHANICS (STATIC)	78	72	6	B	
MPE 100	Mathematic I	78	72	6	B	
EWRT 103	Microbiology	63	37	4	B	
NTU100	HUMAN RIGHTS and DEMOCRACY	33	17	2	C	
NTU101	ENGLISH LANGUAGE	33	17	2	C	

Semester 2 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
EWRT 104	Dynamics	48	77	5.00	B	
MPE 101	Engineering Drawing	93	82	7.00	B	
EWRT 105	Environmental Geology	33	42	3.00	B	
MPE 102	Mathematics II	78	72	6.00	B	
EWRT 106	Introduction to Water Resources Engineering	48	52	4.00	B	
NTU102	Computer	48	27	3.00	C	
NTU103	Arabic Language	33	17	2.00	C	

Semester 3 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
EWRT 107	Fluids Mechanics	93	57	6.00	B	
EWRT 108	Engineering Surveying	93	32	5.00	B	

EWRT 109	Water Supply Networks	45	80	5.00	B	
EWRT 110	BUILDING CONSTRUCTION	45	55	4.00	B	
EWRT 111	Solid Waste Engineering	60	65	5.00	B	
EWRT 112	Diploma project	45	30	3.00	B	
NTU200	Crimes of Baath Party	33	17	2.00	C	

Semester 4 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
EWRT 113	Engineering Hydrology	78.00	72	6.00	B	
EWRT 114	Strength of Materials	48	52	4.00	B	
EWRT 115	Soil Mechanics	90	60	6.00	B	
EWRT 116	Water Quality Engineering	78	72	6.00	B	
EWRT 117	Drainage Engineering	78	72	6.00	B	
NTU201	PROFESSIONAL ETHICS	33.00	17	2.00	C	

Semester 5 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
EWRT 118	Sewers Networks	48	102	6.00	B	
EWRT 119	Air Pollution Control	63	87	6.00	B	
EWRT 120	advance surface Hydrology	78.00	72	6.00	B	
EWRT 121	Hydraulics Applications	63	87	6.00	B	
EWRT 122	Survey Applications	78.00	72	6.00	B	

Semester 6 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
EWRT 123	Environmental Thermodynamics	48	52	4.00	B	
EWRT 124	Numerical Analysis	45	80	5.00	B	
EWRT 125	Reinforced Concrete	78	47	5.00	B	
EWRT 126	Wastewater Treatment Plant Design	78	72	6.00	B	
EWRT 127	Groundwater Hydrology	78	22	4.00	B	
EWRT 128	Foundations Engineering	78	72	6.00	B	

Semester 7 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
EWRT 129	Design of Water Treatment Plants	63	87	6.00	B	
EWRT 130	Design of Hydraulic Structures I	78	72	6.00	B	
EWRT 131	Soil and Ground Water Pollution	63	87	6.00	B	
EWRT 132	Open Channels	78	47	5.00	B	
EWRT 133	Design of Gravity Irrigation Systems	48	52	4.00	B	
EWRT 134	Engineering Project I	33	42	3.00	B	

Semester 8 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
EWRT 135	Engineering Project Management and Economy	63	62	5.00	B	
EWRT 136	Design of Irrigation and Drainage Networks	63	62	5.00	B	
EWRT 137	Design of Sprinkler and Drip Irrigation Systems	93	82	7.00	B	
EWRT 138	Design of Hydraulic Structures II	63	62	5.00	B	
EWRT 139	Estimation and Specifications	63	62	5.00	B	
EWRT 140	Engineering Project 2	33	42	3.00	B	

MODULE DESCRIPTION FORM

Soil Physics PROGRAMME COURSE DESCRIPTION

Code	Name of the Course Unit	Semester	In-Class Hours (T+P)	Credit	ECTS Credit
EWRT 100	Soil Physics	1	4	3	6

GENERAL INFORMATION	
Language of Instruction:	Arabic
Level of the Course Unit :	DIPLOMA DEGREE
Type of the Course :	Compulsory
Mode of Delivery of the Course Unit	Face to Face
Coordinator of the Course Unit	Assist. Prof.Dr. ABDULNASER KASMOOLA
Instructor(s) of the Course Unit	Assist. Prof.Dr. ABDULNASER KASMOOLA

OBJECTIVES AND CONTENTS	
Objectives of the Course Unit:	• 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.

WEEK	KEY LEARNING OUTCOMES OF THE COURSE UNIT (On successful completion of this course unit, students/learners will or will be able to)
1	• Introducing the student to the ABCs of soil physics
2	• Introducing the student to the basic properties of soil physics
3	• Introducing the student to the mathematical relationships of volume and mass
4	• Introducing the student to the most important methods of measuring water flow in the soil.
5	Introducing the student to methods for measuring soil moisture content
6	• Introducing the student to how to calculate potentials in the soil Monitors and conducts Standard tests & specification.

WEEK	KEY LEARNING OUTCOMES OF THE COURSE UNIT (On successful completion of this course unit, students/learners will or will be able to)
7	Introducing the student to how to calculate the soil moisture curve
8	• Introducing the student to how to measure water flow to saturated soil
9	Introducing the student to Darcy's law.
10	Introducing the student to calculating the hydraulic conductivity and permeability of soil
11	Introducing students to calculating water flow in unsaturated soil
12	Introducing students to methods of using general equations of flow
13	Introducing the student to surface tension and its practical applications
14	Introducing the student to shear stress and methods of measuring it
15	Introducing the student to soil sorptivity and methods for measuring it

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

- **Course Evaluation**

Evaluation type	Degree
2 quizzes	10
4 homework	10

Term exam	**30**
Final exam	**50**
Total	**100**

Environmental Chemistry PROGRAMME COURSE DESCRIPTION

Code	Name of the Course Unit	Semester	In-Class Hours (T+P)	Credit	ECTS Credit
EWRT 101	Environmental Chemistry	1	4	3	4

GENERAL INFORMATION	
Language of Instruction:	English
Level of the Course Unit:	DIPLOMA DEGREE
Type of the Course:	Compulsory
Mode of Delivery of the Course Unit	Face to Face
Coordinator of the Course Unit	Dr. maha mohammed taha hassan
Instructor(s) of the Course Unit	Dr. maha mohammed taha hassan

OBJECTIVES AND CONTENTS	
Objectives of the Course Unit:	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

OBJECTIVES AND CONTENTS	
	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
Contents of the Course Unit:	

KEY LEARNING OUTCOMES OF THE COURSE UNIT (On successful completion of this course unit, students/learners will or will be able to)

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

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

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

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

5- 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).

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

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

Practical Part

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

2- Physical unit operation:

3- 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.

4- Chemical unit operations.:-

5- Chemical Coagulation, Colloidal destabilization, Chemical precipitation, disinfection

6- Reaction kinetics and reactors:

7- 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.

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

KEY LEARNING OUTCOMES OF THE COURSE UNIT (On successful completion of this course unit, students/learners will or will be able to)

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**		

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to unit operations and processes in water and wastewater , combination of unit operations and processes in treatment process train .
Week 2	Physical unit operations: screening , ,comminutors , grit removal
Week 3	mixing &flocculation , energy dissipation in mixing, type of mixers, sedimentation &flotation , oxygen transfer
Week 4	Membranes processes ,Reverse osmosis , ion exchanges
Week 5	Adsorption & absorption fundamental ., filtration
Week 6	Chemical unit operations.:- Chemical Coagulation, Colloidal destabilization,
Week 7	Chemical precipitation, ,disinfection
Week 8	Reaction kinetics and reactors : Reactions types, Reaction order, Reaction rates, Types of reactors,
Week 9	mass balance principle, Modeling treatment process kinetics,
Week 10	Treatment process involving mass transfer, Gas-Liquid mass transfer, Two film theory Liquid-Solid mass

ENGINEERING MECHANICS (STATIC) PROGRAMME COURSE DESCRIPTION

Code	Name of the Course Unit	Semester	In-Class Hours (T+P)	Credit	ECTS Credit
EWRT 102	ENGINEERING MECHANICS (STATIC)	1	3	3	6

OBJECTIVES AND CONTENTS	
Module 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..

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

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

MATHEMATIC I PROGRAMME COURSE DESCRIPTION

Code	Name of the Course Unit	Semester	In-Class Hours (T+P)	Credit	ECTS Credit
MPE 100	Mathematic I	1	5	4	6

GENERAL INFORMATION	
Language of Instruction :	English
Level of the Course Unit :	DIPLOMA DEGREE
Type of the Course :	Compulsory
Mode of Delivery of the Course Unit	Face to Face
Coordinator of the Course Unit	Assist. Prof. Dr. Mohammad Akram Saadi AL-DABBAGH
Instructor(s) of the Course Unit	Assist. Prof. Dr. Mohammad Akram Saadi AL-DABBAGH

OBJECTIVES AND CONTENTS	
	• Enhance students' proficiency in mathematical techniques • and problem-solving methods. • Encourage logical reasoning, pattern recognition, and critical thinking skills. • Use mathematical principles to solve real-world problems and understand their applications.

KEY LEARNING OUTCOMES OF THE COURSE UNIT (On successful completion of this course unit, students/learners will or will be able to)	
1	CLO-1: Recognize fundamentals of math and the emphasis on functions and graphs(i).
2	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).
3	**Orthographic projection:** First and third angle projection method CLO-3: Finding the derivative of various types of functions using the differentiation rules (i).
4	CLO-4: Appling differentiation to find linear approximation and optimization problems(ii)
5	CLO-5:solve matrices and operations on matrices and using matrices in solving linear equations(i).

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 ofTrigonometric Functions (17 hrs).
Part B – Limits and Continuity Limits, The Sandwich Theorem and (sin θ)/ θ, 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, Gamer's rule to solve the system of equations, Gaussian elimination. (18hrs).

Teaching and larnin 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 severalcomponents that include studying lectures, tutorial, discussion,homework, and e-learning platforms. Th course will be taught in English, and all compulsory assignments have to be submitted within the deadlines to be admitted to the exam.

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**		

Module Evaluation					
		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**
	Online Assignments	**1**	**2% (2)**	**6**	**CLO-1, CLO-2.**

	Onsite Assignment	**5**	**2% (10)**	**3, 6, 9, 12 and 15**	**CLO-1, CLO-2, CLO-3,CLO-4, CLO-5.**
	Projects / Lab.	**0**	**0**	**0**	
	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)**		

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week1	**Coordinates and Graphs in the Plane, Slope and Equations for Lines.**
Week2	**Functions and Their Graphs, shifts, circles and parabolas.**
Week3	**A review of trigonometric functions.**
Week4	**Limits, the sandwich theorem and (sin θ)/θ, limits involving infinity**
Week5	**Continuous functions.**
Week6	**Slope, tangent lines, and derivatives, differentiation rules, velocity, speed and other rate of change.**
Week7	**Derivatives of trigonometric functions.**
Week8	**The chain rule, implicit differentiation and fractional powers, linear approximations and differentials.**
Week9	**Related rates of change.**
Week10	**Maximal, minima and the mean value theorem, curve sketching with y' , y'' .**
Week11	**Graphing Rational Functions-Asymptotes and Dominant Terms.**
Week12	**Optimization.**
Week13	**Operation on matrices, Equal matrices, Addition and Subtraction of matrices, Multiplication by scalar, Multiplication of matrices,**
Week14	**Transpose of a matrices, adjoin of a square matrix, Determinants, Properties of determinants and Singular matrix.**

Week15	**Solution of system of equations by matrix inversion, Gamer's rule, Gaussian elimination.**
Week16	**Preparatory week before the final Exam**

Microbiology PROGRAMME COURSE DESCRIPTION

Code	Name of the Course Unit	Semester	In-Class Hours (T+P)	Credit	ECTS Credit
EWRT 103	Microbiology	1	4	3	4

GENERAL INFORMATION	
Language of Instruction :	English
Level of the Course Unit :	DIPLOMA DEGREE
Type of the Course :	Compulsory
Mode of Delivery of the Course Unit	Face to Face
Coordinator of the Course Unit	Alaa Imad Hameed

Module 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 to Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks.

GENERAL INFORMATION	
Instructor(s) of the Course Unit	**Alaa Imad Hameed**

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 ofTrigonometric Functions (17 hrs).
Part B – Limits and Continuity Limits, The Sandwich Theorem and (sin θ)/ θ, 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, Gamer's rule to solve the system of equations, Gaussian elimination. (18hrs).

Indicative content includes the following.
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 .**

Module 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.**

Teaching and larnin 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 animportant 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.

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**		

Module Evaluation					
		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**
	Assignment	**5**	**12% (12)**	**2, 3, 4, 6, and 10**	**CLO-2, CLO-2, CLO-3, CLO-2, CLO-3**
	Projects / Lab.	**6**	**8% (8)**	**13**	**CLO-2 to CLO-6**
	Report	**1**	**4% (4)**		**All**
	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)		

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1&2	**Introduction to Microbiology** **Why we are concerning for studying Environmental Microbiology, and Germ theory.**
Week 3	**Classification the microorganisms** **Studying different types of classifications of microorganisms and Bacterial morphologies.**
Week 4&5	**Bacterial cell chemistry** **Studying microorganisms cell structure and cell chemistry.**
Week 6&7	**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.**
Week 8	**Microorganisms in water and bacterial content** **The types of pathogens and its indicators, standards specifications of drinking water**
Week 9	**Detection of evidence of water contamination** **Coliform and fecal bacteria, viruses.**
Week 10&11	**Use the microscope and prepare the slides for examination** **Laboratory lectures for practical testing**
Week 12	**Most probability number test for coiform bacteria** **The most important test for environmental engineers for pollution indicators**
Week 13&14	**Biological treatment** **Role of microorganisms in biological treatment of wastewater and the factors that effect on microorganisms activities in wastewater.**
Week 15	**Review before the final Exam**
Week11	**Graphing Rational Functions-Asymptotes and Dominant Terms.**
Week12	**Optimization.**
Week13	**Operation on matrices, Equal matrices, Addition and Subtraction of matrices, Multiplication by scalar, Multiplication of matrices,**
Week14	**Transpose of a matrices, adjoin of a square matrix, Determinants, Properties of determinants and Singular matrix.**
Week15	**Solution of system of equations by matrix inversion, Gamer's rule, Gaussian elimination.**
Week16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)	
	Material Covered
Week 1	**Lab Safety**
Week 2	**Microscopes**
Week3	**Bacteria morphology**
Week4	**Total number of bacteria**
Week5	**Detection of coliform bacteria**

HUMAN RIGHTS and DEMOCRACY PROGRAMME COURSE DESCRIPTION

Code	Name of the Course Unit	Semester	In-Class Hours (T+P)	Credit	ECTS Credit
NTU100	HUMAN RIGHTS and DEMOCRACY	1	2	2	2

GENERAL INFORMATION	
Language of Instruction :	ARABIC
Level of the Course Unit :	DIPLOMA DEGREE
Type of the Course :	Compulsory
Mode of Delivery of the Course Unit	Face to Face
Coordinator of the Course Unit	Assist. Prof. ABDULNASER KASMOOLA
Instructor(s) of the Course Unit	Assist. Prof. ABDULNASER KASMOOLA

OBJECTIVES AND CONTENTS	
Objectives of the Course Unit:	
Contents of the Course Unit:	

KEY LEARNING OUTCOMES OF THE COURSE UNIT (On successful completion of this course unit, students/learners will or will be able to)

Week	Topics(Subjects)

KEY LEARNING OUTCOMES OF THE COURSE UNIT (On successful completion of this course unit, students/learners will or will be able to)	
1	حقوق الانسان ، تعريفها ، اهدافها
2	حقوق الانسان في الشرائع السماوية مع التركيز على حقوق الانسان في الاسلام
3	حقوق الانسان في التاريخ المعاصر والحديث : الاعتراف الدولي بحقوق الانسان منذ الحرب العالمية الأولى وعصبة الامم
4	الاعتراف الاقليمي بحقوق الانسان : الاتفاقية الاوربية لحقوق الانسان ١٩٥٠ ، الاتفاقية الامريكية لحقوق الانسان ١٩٦٩ ، الميثاق الافريقي لحقوق الانسان ١٩٨١ ، الميثاق العربي لحقوق الانسان ١٩٩٤
5	المنظمات غير الحكومية وحقوق الانسان (اللجنة الدولية للصليب الاحمر ، منظمة العفو الدولية ، منظمة مراقبة حقوق
6	حقوق الانسان في الدساتير العراقية بين النظرية والواقع
7	العلاقة بين حقوق الانسان والحريات العامة :
8	حقوق الانسان الاقتصادية والاجتماعية والثقافية و حقوق الانسان المدنية والسياسية
9	حقوق الانسان الحديثة : الحقائق في التنمية ، الحق في البيئة النظيفة ، الحق في التضامن ، الحق في الدين
10	ضمانات احترام وحماية حقوق الانسان على الصعيد الوطني ، الضمانات في الدستور والقوانين ، الضمانات في مبدأ سيادة القانون
11	ضمانات واحترام وحماية حقوق الانسان على الصعيد الدولي : - دور الأمم المتحدة ووكالاتها المتخصصة في توفير الضمانات - دور المنظمات الاقليمية (الجامعة العربية ، الاتحاد الأوربي ، الاتحاد الافريقي ، منظمة الدول الأمريكية ، منظمة آسيان)
12	النظرية العامة للحريات : أصل الحقوق والحريات ، موقف المشروع من الحقوق والحريات المعلنة ، استخدام مصطلح الحريات العامة
13	القاعدة الشرعية لدولة القانون
14,15	تنظيم الحريات العامة من قبل السلطات العامة

WORKLOAD & ECTS CREDITS OF THE COURSE UNI HUMAN RIGHTS and DEMOCRACY			
Workload for Learning & Teaching Activities			
Type of the Learning Activites	**Learning Activities (# of week)**	**Duration (hours, h)**	**Workload (h)**
Lecture & In-Class Activities	15	2	30
Preliminary & Further Study	NA	NA	NA
Land Surveying	NA	NA	NA
Group Work	NA	NA	NA
Laboratory	NA	NA	NA
Reading	NA	NA	NA
Assignment (Homework)	3	1	3
Project Work	NA	NA	NA

WORKLOAD & ECTS CREDITS OF THE COURSE UNI	HUMAN RIGHTS and DEMOCRACY		
Workload for Learning & Teaching Activities			
Type of the Learning Activites	**Learning Activities (# of week)**	**Duration (hours, h)**	**Workload (h)**
Seminar	3	1	3
Internship	NA	NA	NA
Technical Visit	NA	NA	NA
Web Based Learning	NA	NA	NA
Implementation/Application/Practice	NA	NA	NA
Practice at a workplace	NA	NA	NA
Occupational Activity	NA	NA	NA
Social Activity	NA	NA	NA
Thesis Work	NA	NA	NA
Field Study	NA	NA	NA
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**

ENGLISH LANGUGE PROGRAMME COURSE DESCRIPTION

Code	Name of the Course Unit	Semester	In-Class Hours (T+P)	Credit	ECTS Credit
NTU 101	**ENGLISH LANGUGE**	**2**	**2**	**2**	**2**

GENERAL INFORMATION	
Language of Instruction :	**English**
Level of the Course Unit :	**DIPLOMA DEGREE**
Type of the Course :	**Compulsory**
Mode of Delivery of the Course Unit	**Face to Face**
Coordinator of the Course Unit	**Assist. Prof. ABDULNASER KASMOOLA**
Instructor(s) of the Course Unit	**Assist. Prof. ABDULNASER KASMOOLA**

OBJECTIVES AND CONTENTS	
Objectives of the Course Unit:	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.
Contents of the Course Unit:	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

KEY LEARNING OUTCOMES OF THE COURSE UNIT (On successful completion of this course unit, students/learners will or will be able to)

- 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.

WEEKLY COURSE CONTENTS AND STUDY MATERIALS FOR PRELIMINARY & FURTHER

Week	Topics(Subjects)
1	Introduction to the Course Goals, Assignments, Schedule, Criteria, Policies
	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.
2	Managing conversation: Agreeing, Disagreeing and Partially Agreeing
	Unit 2: Wild World Listening conversations and reading a text about animals and their characteristics and human's attitudes to animals
3	Managing conversations on similarities and differences between humans and chimpanzees with using a wide range of Verbs of Senses and Articles
4	Unit 3: On the Money Listening to people talking about how they spend money and writing a web article called 'How to be rich'
5	Reading an article about money trends, giving and responding to opinions about money issues with the use of Future Forms.
6	Reading and analyzing movie review; Hobbits and Other Creatures Studying on Adjective Clauses with Prepositions
7	MID-TERM EXAM
8	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.
9	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
10	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
11	Linking Ideas: Present and Past Irregular Plurals, Consonants, There was/were Countable and Uncountable Nouns, Imperatives Healthy Living and habits
12	Can for ability Could and Couldn't Skills at work Can for requests Adjectives and Adverbs
13	Describing People, Present Continuous and Adjectives Have to/ don't have to Housework, home, school & work obligations
14,15	Offering and Inviting Why...? Would you like to…? Let's…? Free time activities
	Be going to + infinitive for plans
	Be going to weak forms: Maybe/perhaps
	Past Simple have to

WORKLOAD & ECTS CREDITS OF THE COURSE UNIT NTU 101 ENGLISH SKILLS			
Workload for Learning & Teaching Activities			
Type of the Learning Activites	**Learning Activities (# of week)**	**Duration (hours, h)**	**Workload (h)**
Lecture & In-Class Activities	15	2	30
Preliminary & Further Study	NA	NA	NA
Land Surveying	NA	NA	NA
Group Work	NA	NA	NA
Laboratory	NA	NA	NA
Reading	NA	NA	NA
Assignment (Homework)	2	1	2
Project Work	NA	NA	NA
Seminar	2	1	2
Internship	NA	NA	NA
Technical Visit	NA	NA	NA
Web Based Learning	NA	NA	NA
Implementation/Application/Practice	NA	NA	NA
Practice at a workplace	NA	NA	NA
Occupational Activity	NA	NA	NA
Social Activity	NA	NA	NA
Thesis Work	NA	NA	NA
Field Study	NA	NA	NA
Report Writing	NA	NA	NA
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**

Level 1 – Second Semester

CODE	TITLE	T	P	C	ECTS	
EWRT 104	Dynamics	2	1	3	5	Bologna Content
MPE 101	Engineering Drawing	0	6	3	7	
EWRT 105	Environmental Geology	2	0	2	3	
MPE 102	Mathematics II	3	2	4	6	
EWRT 106	Introduction to Water Resources Engineering	2	1	3	4	
NTU102	COMPUTER PRINCIPLES	1	2	2	3	
NTU103	ARABIC LANGUAGE	2	0	2	2	
T: Theoritical, P:Practical, C:Credit		12	12	19	30	

ECTS Credits allocated for the Course Unit	**2**

DYNAMICS PROGRAMME COURSE DESCRIPTION

Code	Name of the Course Unit	Semester	In-Class Hours (T+P)	Credit	ECTS Credit
EWRT 104	DYNAMICS	2	3	3	5

GENERAL INFORMATION	
Language of Instruction :	English
Level of the Course Unit :	DIPLOMA DEGREE
Type of the Course :	Compulsory
Mode of Delivery of the Course Unit	Face to Face
Coordinator of the Course Unit	Assist. Prof. Dr.Mohammad Akram Saadi AL-DABBAGH
Instructor(s) of the Course Unit	Assist. Prof. Dr.Mohammad Akram Saadi AL-DABBAGH

OBJECTIVES AND CONTENTS	
Objectives of the Course Unit:	1. **Understand Kinematics and Kinetics**: Learn the basic laws and principles of plane kinematics and kinetics of particles and rigid bodies. 2. **Analyze Motion**: Develop skills to analyze rectilinear and curvilinear motion, including position, displacement, velocity, and acceleration. 3. **Apply Mathematical Tools**: Use mathematical methods to derive equations of motion and plot acceleration, velocity, and displacement versus tim

KEY LEARNING OUTCOMES OF THE COURSE UNIT (On successful completion of this course unit, students/learners will or will be able to)	
1,2,3	Demonstrates knowledge and conducts the frames Analysis (method of members)
4,5	• Demonstrates knowledge Friction, Theory of friction, Types of friction, Wedges, Applications • Computes Angle of friction
6,7,8	Computes Centroids of areas & lines, Centroids by integration, Centroids of composite areas, Applications.

KEY LEARNING OUTCOMES OF THE COURSE UNIT (On successful completion of this course unit, students/learners will or will be able to)	
9	**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 .**
10,11	• **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.**
12,13	**Demonstrates knowledge of the Rectilinear translation, Rectilinear motion with constant acceleration, Free falling bodies.**
14,15	**Demonstrates knowledge of the Kinetics of rectilinear translation (Analysis as a particle), Dynamic Equilibrium in translation (Analysis as a rigid body).**

WORKLOAD & ECTS CREDITS OF THE COURSE UNIT
EWRT 104 ENGINEERING MECHANICS (DYNAMICS)

Workload for Learning & Teaching Activities

Type of the Learning Activites	Learning Activities (# of week)	Duration (hours, h)	Workload (h)
Lecture & In-Class Activities	15	4	60
Preliminary & Further Study	6	1	6
Land Surveying	NA	NA	NA
Group Work	2	1	2
Laboratory	NA	NA	NA
Reading	NA	NA	NA
Assignment (Homework)	8	2	16
Project Work	NA	NA	NA
Seminar	NA	NA	NA
Internship	NA	NA	NA
Technical Visit	NA	NA	NA
Web Based Learning	3	1	3
Implementation/Application/Practice	8	1	8
Practice at a workplace	NA	NA	NA
Occupational Activity	NA	NA	NA
Social Activity	NA	NA	NA

WORKLOAD & ECTS CREDITS OF THE COURSE UNIT EWRT 104 ENGINEERING MECHANICS (DYNAMICS)			
Workload for Learning & Teaching Activities			
Type of the Learning Activites	**Learning Activities (# of week)**	**Duration (hours, h)**	**Workload (h)**
Thesis Work	NA	NA	NA
Field Study	NA	NA	NA
Report Writing	NA	NA	NA
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**

ENGINEERING DRAWING PROGRAMME COURSE DESCRIPTION

Code	Name of the Course Unit	Semester	In-Class Hours (T+P)	Credit	ECTS Credit
MPE 101	Engineering Drawing	2	6	3	7

GENERAL INFORMATION	
Language of Instruction :	English
Level of the Course Unit :	DIPLOMA DEGREE
Type of the Course :	Compulsory
Mode of Delivery of the Course Unit	Face to Face
Coordinator of the Course Unit	Ahmed Azhar Dhnoon

GENERAL INFORMATION	
Instructor(s) of the Course Unit	**Ahmed Azhar Dhnoon**

OBJECTIVES AND CONTENTS	
Objectives of the Course Unit:	• 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.

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

ENGINEERING GEOLOGY PROGRAMME COURSE DESCRIPTION

Teaching and larnin 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.

Code	Name of the Course Unit	Semester	In-Class Hours (T+P)	Credit	ECTS Credit
EWRT 105	**ENGINEERING GEOLOGY**	**2**	**2**	**2**	**3**

GENERAL INFORMATION	
Language of Instruction:	English
Level of the Course Unit :	DIPLOMA DEGREE
Type of the Course :	Compulsory
Mode of Delivery of the Course Unit	Face to Face
Coordinator of the Course Unit	Assist. Prof. Abdullah Ahmed Sheikho
Instructor(s) of the Course Unit	Assist. Prof. Abdullah Ahmed Sheikho

OBJECTIVES AND CONTENTS	
Objectives of the Course Unit:	1. Understand Geological Principles: Learn the fundamental principles of geology, including rock formation, mineralogy, and geological time scales. 2. Identify Geological Hazards: Recognize and assess natural hazards such as earthquakes, landslides, and volcanic activity. 3. Analyze Soil and Rock Properties: Study the physical and mechanical properties of soils and rocks and their implications for engineering projects. 4. Evaluate Site Conditions: Develop skills to evaluate geological conditions at construction sites, including site investigation techniques.

week	KEY LEARNING OUTCOMES OF THE COURSE UNIT (On successful completion of this course unit, students/learners will or will be able to)
	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 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.**

WORKLOAD & ECTS CREDITS OF THE COURSE UNIT
EWRT 105 ENGINEERING GEOLOGY

Workload for Learning & Teaching Activities

Type of the Learning Activites	Learning Activities (# of week)	Duration (hours, h)	Workload (h)
Lecture & In-Class Activities	15	2	30
Preliminary & Further Study	2	1	2
Land Surveying	NA	NA	NA
Group Work	NA	NA	NA
Laboratory	3	1	3
Reading	NA	NA	NA
Assignment (Homework)	4	1	4
Project Work	NA	NA	NA
Seminar	3	1	3

WORKLOAD & ECTS CREDITS OF THE COURSE UNIT EWRT 105 ENGINEERING GEOLOGY			
Workload for Learning & Teaching Activities			
Type of the Learning Activites	**Learning Activities (# of week)**	**Duration (hours, h)**	**Workload (h)**
Internship	NA	NA	NA
Technical Visit	NA	NA	NA
Web Based Learning	NA	NA	NA
Implementation/Application/Practice	NA	NA	NA
Practice at a workplace	NA	NA	NA
Occupational Activity	NA	NA	NA
Social Activity	NA	NA	NA
Thesis Work	NA	NA	NA
Field Study	NA	NA	NA
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**

Mathematic II

Code	Name of the Course Unit	Semester	In-Class Hours (T+P)	Credit	ECTS Credit
MPE 102	Mathematic II	2	5	4	6

Mathematic II	
Language of Instruction :	English
Level of the Course Unit :	DIPLOMA DEGREE
Type of the Course :	Compulsory
Mode of Delivery of the Course Unit	Face to Face
Coordinator of the Course Unit	Assist. Prof. Dr. Adnan Abdul Wahab
Instructor(s) of the Course Unit	Assist. Prof. Dr. Adnan Abdul Wahab

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).

Teaching and larnin 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.

Delivery Plan			
week	**Hours**	**Unit or subject name**	**Required Learning Outcomes**
1	**4**	**plane analytic geometry**	**Identify geometry (Circle, Parabola, Ellipse, Hyperbola) plane analytic**
4	16	**partial derivative**	• **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.**
3	12	**Hyperbolic function**	**Identify the hyperbolic functions, their graphs, their function derivatives, their integrals, and their inverse functions**
4	16	**Multiple Integration**	• **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**
3	12	**Differential Equations**	• **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**

Course Evaluation	
Homework 4	**4**
First Term Exam	**13**

Second Term Exam	**13**
Final Exam	**60**
Total	**100**

COMPUTER PRINCIPLES PROGRAMME COURSE DESCRIPTION

Code	Name of the Course Unit	Semester	In-Class Hours (T+P)	Credit	ECTS Credit
NTU102	COMPUTER PRINCIPLES	2	2	1	2

GENERAL INFORMATION	
Language of Instruction :	English
Level of the Course Unit :	DIPLOMA DEGREE
Type of the Course :	Compulsory
Mode of Delivery of the Course Unit	Face to Face
Coordinator of the Course Unit	Alaa Emad Hamid
Instructor(s) of the Course Unit	Alaa Emad Hamid

OBJECTIVES AND CONTENTS	
Objectives of the Course Unit:	1. **Understand Computer Architecture**: Gain foundational knowledge of compute r architecture, including the CPU, memory, and I/O devices.

Week	Topics (Subjects)
1	**Demonstrates knowledge of the Introduction to computer, computer component (hardware, software)**
2	• **Demonstrates knowledge of the Operating system (windows),** • **Able to install windows (formatting)**
3,4	**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**

Week	Topics (Subjects)
5,6	Able to use Microsoft word 2020
7,8,9	Able to use Microsoft excel 2020
10,11	Able to use Microsoft power point 2020
12	Able to use Internet, internet explorer, starting , menus of internet explorer
13	Able to create and use E-mail : yahoo , Hotmail
14,15	• Able to utilize Search engines, • Able to use google , yahoo , search information

WORKLOAD & ECTS CREDITS OF THE COURSE UNIT NTU102 COMPUTER PRINCIPLES			
Workload for Learning & Teaching Activities			
Type of the Learning Activites	**Learning Activities (# of week)**	**Duration (hours, h)**	**Workload (h)**
Lecture & In-Class Activities	15	1	15
Preliminary & Further Study	NA	NA	NA
Land Surveying	NA	NA	NA
Group Work	NA	NA	NA
Laboratory	15	2	30
Reading	NA	NA	NA
Assignment (Homework)	1	1	1
Project Work	NA	NA	NA
Seminar	٢	١	٢
Internship	NA	NA	NA
Technical Visit	NA	NA	NA
Web Based Learning	٣	١	٣
Implementation/Application/Practice	NA	NA	NA
Practice at a workplace	NA	NA	NA
Occupational Activity	NA	NA	NA
Social Activity	NA	NA	NA
Thesis Work	NA	NA	NA
Field Study	NA	NA	NA
Report Writing	NA	NA	NA

WORKLOAD & ECTS CREDITS OF THE COURSE UNIT NTU102 COMPUTER PRINCIPLES			
Workload for Learning & Teaching Activities			
Type of the Learning Activites	**Learning Activities (# of week)**	**Duration (hours, h)**	**Workload (h)**
Final Exam	1	3	3
Preparation for the Final Exam	1	١٠	١٠
Mid-Term Exam	1	2	2
Preparation for the Mid-Term Exam	1	٥	٥
Short Exam	2	١	٢
Preparation for the Short Exam	2	١	٢
TOTAL	**44**	**28**	**75**
Total Workload of the Course Unit			٧٥
Workload (h) / 25			٣
ECTS Credits allocated for the Course Unit			٣

ABRABIC LANGUAGE

Code	Name of the Course Unit	Semester	In-Class Hours (T+P)	Credit	ECTS Credit
NTU 103	ABRABIC LANGUAGE	2	2	1	2

GENERAL INFORMATION	
Language of Instruction :	Arabic
Level of the Course Unit :	DIPLOMA DEGREE
Type of the Course :	Compulsory
Mode of Delivery of the Course Unit	Face to Face
Coordinator of the Course Unit	Assist. Prof. ABDULNASER KASMOOLA
Instructor(s) of the Course Unit	Assist. Prof. ABDULNASER KASMOOLA
OBJECTIVES AND CONTENTS	
Objectives of the Course Unit:	

OBJECTIVES AND CONTENTS	
Contents of the Course Unit:	

KEY LEARNING OUTCOMES OF THE COURSE UNIT (On successful completion of this course unit, students/learners will or will be able to)	

Topics (Subjects)	
مفهوم الأخطاء اللغوية, قواعد كتابة التاء المربوطة والتاء المفتوحة	1
الالف الممدودة والمقصورة, الحروف الشمسية والقمرية	2
الظاء والضاد	3
كتابةهمزة الوصل و القطع, الهمزة المتوسطة, الهمزة المتطرفة	٤
علامات الترقيم , علامات الترقيم والتفريق بينهما	٥,٦
المفعول به, المفعول المطلق, المفعول لاجله, المفعول فيه	٧
العدد, تطبيقات الاخطاء اللغوية الشائعة	٨,٩,١٠
معاني حروف الجر, قاعدة الالف الفارقة, قاعدة النون والتنوين , الجوانب الشكلية للخطاب الاداري	١١,١٢
لغة الخطاب الاداري	١٣,١٤,١٥,

WORKLOAD & ECTS CREDITS OF THE COURSE UNIT NTU103 Arabic Language			
Workload for Learning & Teaching Activities			
Type of the Learning Activites	**Learning Activities (# of week)**	**Duration (hours, h)**	**Workload (h)**
Lecture & In-Class Activities	15	٢	٣٠
Preliminary & Further Study	NA	NA	NA
Land Surveying	NA	NA	NA
Group Work	NA	NA	NA
Laboratory	NA	NA	NA
Reading	NA	NA	NA
Assignment (Homework)	٢	1	٢
Project Work	NA	NA	NA

WORKLOAD & ECTS CREDITS OF THE COURSE UNIT NTU103 Arabic Language			
Workload for Learning & Teaching Activities			
Type of the Learning Activites	**Learning Activities (# of week)**	**Duration (hours, h)**	**Workload (h)**
Seminar	NA	NA	NA
Internship	NA	NA	NA
Technical Visit	NA	NA	NA
Web Based Learning	NA	NA	NA
Implementation/Application/Practice	NA	NA	NA
Practice at a workplace	NA	NA	NA
Occupational Activity	NA	NA	NA
Social Activity	NA	NA	NA
Thesis Work	NA	NA	NA
Field Study	NA	NA	NA
Report Writing	NA	NA	NA
Final Exam	1	3	3
Preparation for the Final Exam	1	2	2
Mid-Term Exam	1	٣	٣
Preparation for the Mid-Term Exam	1	٥	٥
Short Exam	2	٢	٢
Preparation for the Short Exam	2	٢	٢
TOTAL	٢٥	٢٠	٤٩
Total Workload of the Course Unit			٤٩
Workload (h) / 25			١,٩٦
ECTS Credits allocated for the Course Unit			**2**

Level 2 – First semester

CODE	TITLE	T	P	C	ECTS	Bologna Content	
EWRT 107	FLUID MECHANICS	2	3	5	5		
EWRT 108	ENGINEERING SURVEYING	3	0	3	5		
EWRT 109	WATER SUPPLY NETWORKS	3	0	3	4		
EWRT 110	BUILDING CONSTRUCTION	3	1	4	5		
EWRT 111	Solid Waste Engineering	3	2	2	3		
EWRT 112	DIPLOMA PROJECT	1	0	2	2		
NTU 200	CRIMES OF BAATH PARTY	2	3	5	5		
T: Theoretical, P: Practical, C: Credit		17	10	23	30		

Fluids Mechanics COURSE DESCRIPTION

Code	Name of the Course Unit	Semester	In-Class Hours (T+P)	Credit	ECTS Credit
EWRT 107	Fluids Mechanics	3	6	4	6

GENERAL INFORMATION	
Language of Instruction :	English
Level of the Course Unit :	DIPLOMA DEGREE
Type of the Course :	Compulsory
Mode of Delivery of the Course Unit	FACE to FACE
Coordinator of the Course Unit	Assist. Prof. ABDULNASER KASMOOLA
Instructor(s) of the Course Unit	Assist. Prof. ABDULNASER KASMOOLA

OBJECTIVES AND CONTENTS	
Objectives of the Course Unit:	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).

KEY LEARNING OUTCOMES OF THE COURSE UNIT (On successful completion of this course unit, students/learners will or will be able to:
This course has several components that include lectures, individual assignments, and e-learning platforms. The course will be taught in Englis and all mandatory assignments have to be submitted within the deadlines be admitted to the exams.

WEEK	SUBJECT
2	Fluids properties , Fluid statics Pressure in fluid ; Types of pressure; Pressure measuring devices.
2	Pressure force on, submerged plane surface; Pressure, force on submerged
2	curved surface . Fluid Kinematics: lectures, Flow patterns; individual Continuity equation, and its applications and e-learn platforms
2	curved surface. Fluid Kinematics:Flow patterns Continuity equation, and its applications and
3	Bernoulli's equation, and its applications.

2	Momentum equation and its applications.
3	Flow of real fluid pipe, friction loss types of problems minor losses
1	Pipes in series and parallel

Course Evaluation	
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%**

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 . MaGraw Hill, Inc.** **2. Cengel Y. and Cimbala J., 2014, Fluid Mechanics Fundamentals and Applications, 4th edition, McGraw Hill.**

Engineering SURVEYING PROGRAMME COURSE DESCRIPTION

Code	Name of the Course Unit	Semester	In-Class Hours (T+P)	Credit	ECTS Credit
EWRT 108	Engineering SURVEYING	3	6	5	5

GENERAL INFORMATION	
Language of Instruction:	English
Level of the Course Unit:	DIPLOMA DEGREE

GENERAL INFORMATION	
Type of the Course:	**Compulsory**
Mode of Delivery of the Course Unit	**Face to Face**
Coordinator of the Course Unit	**Assist. Prof. Dr. Adnan Abdul Wahab**
Instructor(s) of the Course Unit	**Assist. Prof. Dr. Adnan Abdul Wahab**

OBJECTIVES AND CONTENTS	
Objectives of the Course Unit:	**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.**

week	KEY LEARNING OUTCOMES OF THE COURSE UNIT (On successful completion of this course unit, students/learners will or will be able to)
1	**Draws Contour lines: Method of drawing and construction.**
2,3	**Calculates Areas and volumes: Volume computation from cross-section, Volume from**
4	**Demonstrates knowledge about Theodolites, Principle of construction**
5	Correctly implement Measuring Horizontal angles
6	Recognition of laboratory Directions, Whole circle bearing, Reduce Bearing
7	Demonstrates knowledge about Traverse Surveys, Bearings, forward & Back bearing
8	Correctly implement Close circle traverse, coordinates calculations
9	Monitors and conducts Tachometry, stadia tachometry, Inclined sights
10	Carries out Electromagnetic distance measurement (EDM), basic concept, systems
11	Demonstrates knowledge about Total station, Field Techniques, point location, missing line
12	Demonstrates knowledge about resection, azimuth, elevation, layout positions and area
13,14	Demonstrates knowledge about Motorized Total stations.
15	Correctly draw horizontal curves kinds.

WORKLOAD & ECTS CREDITS OF THE COURSE UNIT EWRT 108 SURVEYING-I			
Workload for Learning & Teaching Activities			
Type of the Learning Activites	**Learning Activities (# of week)**	**Duration (hours, h)**	**Workload (h)**
Lecture & In-Class Activities	15	5	75

WORKLOAD & ECTS CREDITS OF THE COURSE UNIT EWRT 108 SURVEYING-I			
Workload for Learning & Teaching Activities			
Type of the Learning Activites	**Learning Activities (# of week)**	**Duration (hours, h)**	**Workload (h)**
Preliminary & Further Study	NA	NA	NA
Land Surveying	2	1	2
Group Work	1	1	1
Laboratory	8	1	8
Reading	NA	NA	NA
Assignment (Homework)	4	1	4
Project Work	1	1	1
Seminar	3	1	1
Internship	NA	NA	NA
Technical Visit	NA	NA	NA
Web Based Learning	NA	NA	NA
Implementation/Application/Practice	NA	NA	NA
Practice at a workplace	NA	NA	NA
Occupational Activity	NA	NA	NA
Social Activity	NA	NA	NA
Thesis Work	NA	NA	NA
Field Study	NA	NA	NA
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**

WATER SUPPLY NETWORKS PROGRAMME COURSE DESCRIPTION

Code	Name of the Course Unit	Semester	In-Class Hours (T+P)	Credit	ECTS Credit
EWRT 109	Water supply networks	3	3	3	5

GENERAL INFORMATION	
Language of Instruction :	English
Level of the Course Unit :	DIPLOMA DEGREE
Type of the Course :	Compulsory
Mode of Delivery of the Course Unit	FACE to FACE
Coordinator of the Course Unit	Assist. Prof Abdullah Ahmed Sheikho
Instructor(s) of the Course Unit	Assist. Prof. Abdullah Ahmed Sheikho

OBJECTIVES AND CONTENTS	
Objectives of the Course Unit:	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 rehabitation.

KEY LEARNING OUTCOMES OF THE COURSE UNIT (On successful completion of this course unit, students/learners will or will be able to)

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).

KEY LEARNING OUTCOMES OF THE COURSE UNIT (On successful completion of this course unit, students/learners will or will be able to)
CLO-5: Learning skills in the design and analysis of water network using computer software (i) and (iv)

WEEK	SUBJECT
1	Hazen Williams equation and its applications, equivalent pipe principle.
2	. Water distribution system: Basic types of demand, peaking factors, demand estimation, skeletonization, demand allocation.
3	Distribution methods, configuration of distribution system.
4	Design and analysis of water networks, sequences of analysis and design steps, design consideration.
5	Examples on analysis and design of branched network.
6	Hardy-Cross method, example on looped network analysis.
7	Service storage tanks, types of tanks, storage volume components, methods of equalization volume computation
8	Examples on equalization volume computation, fire storage.
9	Emergency storage, tank location, quality of water tank, tank maintenance.
10	Pump stations, types of pumps, total dynamic head, system head curve, pump characteristics curves, selection of pumping units.
11	Flow range of centrifugal pumps, pumps connection in series and parallel, examples.
12	Cavitation phenomenon and net positive suction head, affinity laws, specific speed, examples.
13	Computer software applications.
14	Pipe material selection, advantages and disadvantages of different types of pipes, types of valves.
15	Loads on buried pipes, Marston equation, bedding pipe selection, truck load, internal pressure,

	thrust forces, examples .

BUILDING CONSTRUCTION PROGRAMME COURSE DESCRIPTION

Code	Name of the Course Unit	Semester	In-Class Hours (T+P)	Credit	ECTS Credit
EWRT 110	BUILDING CONSTRUCTION	3	3	3	4

GENERAL INFORMATION	
Language of Instruction :	English
Level of the Course Unit :	DIPLOMA DEGREE
Type of the Course :	Compulsory
Mode of Delivery of the Course Unit	FACE to FACE
Coordinator of the Course Unit	Assist. Prof. Dr. Mohammed Akram Saadi Al-Dabbagh
Instructor(s) of the Course Unit	Assist. Prof. Dr. Mohammed Akram Saadi Al-Dabbagh

OBJECTIVES AND CONTENTS	
Objectives of the Course Unit:	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

KEY LEARNING OUTCOMES OF THE COURSE UNIT (On successful completion of this course unit, students/learners will or will be able to:

WEEK	SUBJECT
1	Carries out Site investigation, phases of site and soil investigation.
2	Conducts the Standard tests concerning Methods of soil investigation, open-pit, boring and auger, standard and cone test methods.
3	• 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.
4	Conducts the Standard tests concerning Excavation and filling work, cut and fill, shoring system, angle of repose, failure of embankment, layers of filling.

5,6	Able to identify and correctly implement Types of foundations, excavation, shoring system, reinforcing and concrete casting, drying of site work.
7	Able to identify Pile foundations, bored and driven piles, sheet piles, capping of piles.
8	• 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.
9	• 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.
10	Demonstrates knowledge about Hollow cavity walls, their specifications and components, reinforced walls.
11	Demonstrates knowledge and able to identify Thermal insulation materials, specification and types, thermal transmittance factor, resistance concept.
12	Recognition of laboratory and uses correctly Acoustical insulation and fire resistance for building
13	Recognition of laboratory about Concrete Forms, timber forms (specification and components), bracing for roofs and columns.
14,15	Recognition of laboratory about Slip and travel forms, components and operation.

WORKLOAD & ECTS CREDITS OF THE COURSE UNIT
EWRT 110

Workload for Learning & Teaching Activities

Type of the Learning Activities	Learning Activities (# of week)	Duration (hours, h)	Workload (h)
Lecture & In-Class Activities	15	3	45
Preliminary & Further Study	2	1	2
Land Surveying	NA	NA	NA
Group Work	NA	NA	NA
Laboratory	NA	NA	NA
Reading	NA	NA	NA
Assignment (Homework)	8	1	8
Project Work	2	1	2
Seminar	3	1	3
Internship	NA	NA	NA
Technical Visit	NA	NA	NA
Web Based Learning	NA	NA	NA
Implementation/Application/Practice	NA	NA	NA
Practice at a workplace	NA	NA	NA
Occupational Activity	NA	NA	NA
Social Activity	NA	NA	NA
Thesis Work	NA	NA	NA

WORKLOAD & ECTS CREDITS OF THE COURSE UNIT EWRT 110			
Workload for Learning & Teaching Activities			
Type of the Learning Activities	**Learning Activities (# of week)**	**Duration (hours, h)**	**Workload (h)**
Field Study	NA	NA	NA
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**

Solid Waste Engineering PROGRAMME COURSE DESCRIPTION

Code	Name of the Course Unit	Semester	In-Class Hours (T+P)	Credit	ECTS Credit
EWRT 111	Solid Waste Engineering	3	4	4	5

GENERAL INFORMATION	
Language of Instruction :	English
Level of the Course Unit :	BACHELOR'S DEGREE
Type of the Course :	Compulsory
Mode of Delivery of the Course Unit	FACE to FACE
Coordinator of the Course Unit	Dr. Maha Mohammed Taha Hassan

GENERAL INFORMATION	
Instructor(s) of the Course Unit	**Dr. Maha Mohammed Taha Hassan**

OBJECTIVES AND CONTENTS	
Objectives of the Course Unit:	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).

Delivery Plan (Weekly Syllabus)

WEEK	SUBJECT
Week 1	Evolution of Solid-Waste Management
Week 2	Legislative Trends and Impacts
Week 3	Sources, Types, and Composition of Municipal Solid Wastes
Week 4	Application examples about composition of solid waste
Week 5	Physical Properties of Municipal Solid Waste
Week 6	Chemical Properties of Municipal Solid Waste
Week 7	Biological Properties of Municipal Solid Waste
Week 8	Sources, Types, and Properties of Hazardous Wastes Found in Municipal Solid Waste
Week 9	Biological Properties of Municipal Solid Waste
Week 10	Sources, Types, and Properties of Hazardous Wastes Found in Municipal Solid Waste
Week 11	Collection of Solid Waste
Week 12	Mid-Term Exam - Time-cost trade-off.
Week 13,14,15	Transfer and Transport Separation and Processing and Transformation of Solid Waste Disposal of Solid Wastes and Residual Matter

Learning and Teaching Strategies	
Strategies	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.

Module 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, **Module Learning Outcomes** 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)

Student workload (swl)			
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**		

module Evaluation				
	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)
	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)
	Projects / Lab	**1**	**10%**	8 , 9, 10, 11, 12, 13,14,15	(CLO-5 and CLO-8)
	report	**0**	**0%**		
Summative assessment	Midterm Exam	**2HR**	**10%**	**7**	CLO-1, CLO-2, CLO-3, CLO-4 CLO-5)
	Final exam	**3HR**	**50%**	**16**	All
Total assessment			**100%(100 marks)**		

DIPLOMA PROJECT PROGRAMME COURSE DESCRIPTION

Code	Name of the Course Unit	Semester	In-Class Hours (T+P)	Credit	ECTS Credit
EWRT 112	DIPLOMA PROJECT	3	3	2	3

GENERAL INFORMATION	
Language of Instruction :	English
Level of the Course Unit :	BACHELOR'S DEGREE
Type of the Course :	Compulsory
Mode of Delivery of the Course Unit	FACE to FACE
Coordinator of the Course Unit	Assist. Prof. Dr.Abdulnaser Kashmoola
Instructor(s) of the Course Unit	Assist. Prof. Dr.Abdulnaser Kashmoola

OBJECTIVES AND CONTENTS	
Objectives of the	**Show deep understanding and application of key concepts learned throughout the diploma program**

OBJECTIVES AND CONTENTS	
Course Unit:	

WORKLOAD & ECTS CREDITS OF THE COURSE UNIT
EWRT 112

Workload for Learning & Teaching Activities

Type of the Learning Activities	Learning Activities (# of week)	Duration (hours, h)	Workload (h)
Lecture & In-Class Activities	NA	NA	NA
Preliminary & Further Study	NA	NA	NA
Land Surveying	NA	NA	NA
Group Work	NA	NA	NA
Laboratory	NA	NA	NA
Reading	NA	NA	NA
Assignment (Homework)	NA	NA	NA
Project Work	1	10	10
Seminar	1	5	5
Internship	NA	NA	NA
Technical Visit	14	1	14
Web Based Learning	NA	NA	NA
Implementation/Application/Practice	NA	NA	NA
Practice at a workplace	14	2	28
Occupational Activity	NA	NA	NA
Social Activity	NA	NA	NA
Thesis Work	1	5	5
Field Study	NA	NA	NA
Report Writing	1	1	1
Final Exam	NA	NA	NA
Preparation for the Final Exam	NA	NA	NA
Mid-Term Exam	NA	NA	NA
Preparation for the Mid-Term Exam	NA	NA	NA
Short Exam	NA	NA	NA
Preparation for the Short Exam	NA	NA	NA
TOTAL	**32**	**24**	**63**

WORKLOAD & ECTS CREDITS OF THE COURSE UNIT EWRT 112			
Workload for Learning & Teaching Activities			
Type of the Learning Activities	**Learning Activities (# of week)**	**Duration (hours, h)**	**Workload (h)**
Total Workload of the Course Unit			**63**
Workload (h) / 27			**2.3**
ECTS Credits allocated for the Course Unit			**2**

CRIMES OF BAATH PARTY PROGRAMME COURSE DESCRIPTION

Code	Name of the Course Unit	Semester	In-Class Hours (T+P)	Credit	ECTS Credit
NTU 200	CRIMES OF BAATH PARTY	3	2	2	2

GENERAL INFORMATION	
Language of Instruction:	Arabic
Level of the Course Unit :	DIPLOMA DEGREE
Type of the Course :	Compulsory
Mode of Delivery of the Course Unit	Face to Face
Coordinator of the Course Unit	Ahmed Azhar Dhnoon
Instructor(s) of the Course Unit	Ahmed Azhar Dhnoon

OBJECTIVES AND CONTENTS	
Objectives of the Course Unit:	
Contents of the Course Unit:	

KEY LEARNING OUTCOMES OF THE COURSE UNIT (On successful completion of this course unit, students/learners will or will be able to)	
1,2,3,4	جرائم نظام البعث وفق قانون المحكمة الجنائية العراقية العام عام ٢٠٠٥م
5,6,7,8	الجرائم النفسية والاجتماعية وآ ثارها، وأبرز انتهاكات النظام البعثي في العراق
9,10,11,12	الجرائم البيئية لنظام البعث في العراق

KEY LEARNING OUTCOMES OF THE COURSE UNIT (On successful completion of this course unit, students/learners will or will be able to)	
13,14,15	جرائم المقابر الجماعية

WORKLOAD & ECTS CREDITS OF THE COURSE UNIT NTU 200 CRIMES OF BAATH PARTY			
Workload for Learning & Teaching Activities			
Type of the Learning Activites	**Learning Activities (# of week)**	**Duration (hours, h)**	**Workload (h)**
Lecture & In-Class Activities	15	2	30
Preliminary & Further Study	NA	NA	NA
Land Surveying	NA	NA	NA
Group Work	NA	NA	NA
Laboratory	NA	NA	NA
Reading	NA	NA	NA
Assignment (Homework)	4	1	4
Project Work	NA	NA	NA
Seminar	2	1	2
Internship	NA	NA	NA
Technical Visit	NA	NA	NA
Web Based Learning	NA	NA	NA
Implementation/Application/Practice	NA	NA	NA
Practice at a workplace	NA	NA	NA
Occupational Activity	NA	NA	NA
Social Activity	NA	NA	NA
Thesis Work	NA	NA	NA
Field Study	NA	NA	NA
Report Writing	NA	NA	NA
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

Level 2 – Second semester							
CODE	**TITLE**	**T**	**P**	**C**	**ECTS**	**Bologna Content**	
EWRT 113	ENGINEERING HYDROLOGY	5	0	5	6		
EWRT 114	STREENGTH OF MATERIALS	2	1	3	4		
EWRT 115	SOIL MECHANICS	4	2	5	6		
EWRT 116	WATER QUALITY ENGINEERING	3	2	4	6		
EWRT 117	DRAINAGE ENGINEERING	5	0	5	6		
NTU201	PROFESSIONAL ETHICS	2	0	2	2		
T: Theoritical, P: Practical, C: Credit		21	5	24	30		

WORKLOAD & ECTS CREDITS OF THE COURSE UNIT **NTU 200 CRIMES OF BAATH PARTY**			
Workload for Learning & Teaching Activities			
Type of the Learning Activites	**Learning Activities (# of week)**	**Duration (hours, h)**	**Workload (h)**
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**

ENGINEERING HYDROLOGY PROGRAMME COURSE DESCRIPTION

Code	Name of the Course Unit	Semester	In-Class Hours (T+P)	Credit	ECTS Credit
EWRT 113	ENGINEERING HYDROLOGY	4	5	5	6

GENERAL INFORMATION	
Language of Instruction :	English
Level of the Course Unit :	DIPLOMA DEGREE
Type of the Course :	Compulsory
Mode of Delivery of the Course Unit	FACE to FACE
Coordinator of the Course Unit	Abdullah Ahmed Sheikho
Instructor(s) of the Course Unit	Abdullah Ahmed Sheikho

OBJECTIVES AND CONTENTS	
Objectives of the Course Unit:	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

KEY LEARNING OUTCOMES OF THE COURSE UNIT (On successful completion of this course unit, students/learners will or will be able to:

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)

WEEK	SUBJECT

1	Introduction, objectives, definition of hydrology, branch of Hydrology, hydrological cycle, Hydrological Budge Equation ،Engineering Hydrology Application, Typical Failure Factors for Hydraulic Installations, Source of Data.
2	Climate Factors, Temperature, Solar Radiation, Evaporation, Humidity, Vapor Pressure, Wind.
3	Precipitation , Forms of Precipitation, Measurement of precipitation, Types of rain gauge
4	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.
5	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.
6	Abstraction from Precipitation, Losses from precipitation, Evaporation, Evaporimeter, Types of evaporation meters, Class A Evaporation Pan, Pan Coefficien.
7	Evaporation Measurement Stations, Empirical Evaporation Equations, Analytical methods for estimating evaporation, Types of evaporation meters, reducing evaporation from tanks
8	Evapotranspiration, Potential Evapotranspiration, vapotranspiration Equations, Penman Equation, Blaney – Criddle formula, Evapotranspiration Equations
9	Infiltration, Measurement of Infiltration, Infiltration Capacity, Infiltration Capacity Values, Infiltration Indices.
10	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.
11	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.
12	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
13	Hydrograph, Surface Runoff, Inter Flow, Base Flow, Hydrograph component, Factors affecting flood hydrograph, Direct Runoff.
14	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.
15	Flood Routing, Hydrologic Storage Routing, Hydrologic Channel Routing.
16	Preparatory week before the final Exam

module Evaluation					
		Time/ Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative	**Quizzes**	**4**	**24% (24)**	**4,8,11,13**	**CLO-1,3, CLO-2,3, CLO-4,5, CLO-6**
	Assignment	**5**	**16% (16)**	**4,6,10,12,14**	**CLO-1,3, CLO-2,3, CLO-4,5, CLO-6 , CLO-7,8**

assessment	Projects / Lab.	0	0% (0)		
	Report	0	0% (0)		
	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)		

STREENGTH OF MATERIATS PROGRAMME COURSE DESCRIPTION

Code	Name of the Course Unit	Semester	In-Class Hours (T+P)	Credit	ECTS Credit
EWRT 114	STREENGTH OF MATERIATS	4	3	3	4

GENERAL INFORMATION	
Language of Instruction :	English
Level of the Course Unit :	DIPLOMA DEGREE
Type of the Course :	Compulsory
Mode of Delivery of the Course Unit	FACE to FACE
Coordinator of the Course Unit	Assist. Prof. Dr. Mohammed Akram Saadi
Instructor(s) of the Course Unit	Assist. Prof. Dr. Mohammed Akram Saadi

OBJECTIVES AND CONTENTS	
Objectives of the Course Unit:	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

OBJECTIVES AND CONTENTS	
	loads- that is essential to design and evaluate any structural member.

KEY LEARNING OUTCOMES OF THE COURSE UNIT (On successful completion of this course unit, students/learners will or will be able to:

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)

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**		

WEEK	SUBJECT
1	Introduction to Strength of Materials
2	Normal Stress
3	Shear Stress, Bearing Stress
4	Thin Walled Cylinders (Pressure Vessels) + quiz
5	Simple Strain , Stress-Strain Diagram, Hooke's Law
6	Statically Indeterminate Problems
7	Statically Indeterminate Problems
8	Shear and Moment in Beams (Introduction, Supports and Load) + quiz
9	Area Method for Drawing Shear and Moment Diagram
10	Area Method for Drawing Shear and Moment Diagram
11	Shear and stress in beams+ quiz
12	Shear Stresses in Beams
13	Flexural Stresses in Beams+ quiz
14	Beam Deflections (Double Integration Method) + term exam
15	Beam Deflections (Double Integration Method)
16	Preparatory week before the final Exam

module Evaluation					
		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
	Assignment	5	16% (16)	4,6,10,12,14	CLO-1,3, CLO-2,3, CLO-4,5, CLO-6 , CLO-7,8
	Projects / Lab.	0	0% (0)		
	Report	0	0% (0)		
	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)		

SOIL MECHANICS PROGRAMME COURSE DESCRIPTION

Code	Name of the Course Unit	Semester	In-Class Hours (T+P)	Credit	ECTS Credit
EWRT 115	SOIL MECHANICS	5	6	5	6

GENERAL INFORMATION	
Language of Instruction :	English
Level of the Course Unit :	DIPLOMA DEGREE
Type of the Course :	Compulsory
Mode of Delivery of the Course Unit	FACE to FACE
Coordinator of the Course Unit	Assist. Prof. ABDULNASER KASMOOLA
Instructor(s) of the Course Unit	Assist. Prof. ABDULNASER KASMOOLA

OBJECTIVES AND CONTENTS	
Objectives of the Course Unit:	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.

Teaching and larnin Strat	
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.

WEEK	Hours	SUBJECT
1	**3**	**Introduction, types of the soil, soil origin, and formation.**
2+3	**6**	**Physical properties of the soil, weight-volume relationships soil structures.**
4	**3**	**Lecture and Water content and GS tests**
5	**3**	**Soil plasticity and Atterberg limits, clay mineralogy.**
6	**3**	**Soil classification**
7	**3**	**Lecture, Atterberg's limits**
8	**3**	**Permeability of soils, Darcy's law, and soil coefficient of permeability.**
9	**3**	**Lecture and grain size distribution tests test.**
10+11	**3**	**Total and effective stresses and stresses due to external loads**
12	**3**	**Lecture and permeability test**
13-15	**9**	**Seepage of the water through the earth dams.**

- **Course Evaluation**

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**

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**

WATER QUALITY ENGINEERING PROGRAMME COURSE DESCRIPTION

Code	Name of the Course Unit	Semester	In-Class Hours	Credit	ECTS Credit
EWRT 116	WATER QUALITY ENGINEERING	4	5	4	6

GENERAL INFORMATION	
Language of Instruction :	**English**
Level of the Course Unit :	**DIPLOMA DEGREE**
Type of the Course :	**Compulsory**
Mode of Delivery of the Course Unit	**FACE to FACE**
Coordinator of the Course Unit	**Dr. Maha Mohammed Taha Hassan**
Instructor(s) of the Course Unit	**Dr. Maha Mohammed Taha Hassan**

OBJECTIVES AND CONTENTS	
Objectives of the Course Unit:	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.

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.

EEK	Hours	SUBJECT
1	**3**	**Introduction to Environment Lab 1: Solids, Dissolved and Suspended solids, and total solids**
2	**3**	**Hydrological Cycle of water from quantity sides. Lab 1: Solids, Dissolved and Suspended solids, and total solids**
3	**3**	**Properties of water sources, how water sources polluted. Lab 2: Turbidity**
4	**3**	**Effect of engineering project on water quality and self-purification. Lab 2: Turbidity**
5-6	**3**	**Effect of decomposition rate (decomposition constant) on the amount of oxygen required in the process of waste decomposition Lab 3: PH-value Electrical Conductivity**.
7	**3**	**Calculate the change of dissolved oxygen along the riverbed due to wastewater. Lab 3: PH-value& Electrical Conductivity.**
8	**3**	**Mid-term Exam Lab 4: Electrical onductivity**
9	**3**	**Calculate the change of deficit oxygen along the riverbed due to wastewater. Lab 4: Electrical Conductivity**
10	**3**	**Calculate the change of BoD along the riverbed due to wastewater Lab 5: Hardness**
11-12	**3**	**Effect of the quality and quantity of wastewater entering and leaving the lake. Lab 5: Hardness**
13	**3**	**Seasonal inversion in lakes, Effect of detergents on the pollution of the water Lab 6: Dissolved Oxygen**
14	**3**	**Study the type of pollution on the river. Lab 6: Dissolved Oxygen**
15	**3**	**Wastewater treatment**

- **Course Evaluation**

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

DRAINAGE ENGINEERINGPROGRAMME COURSE DESCRIPTION

Code	Name of the Course Unit	Semester	In-Class Hours (T+P)	Credit	ECTS Credit
EWRT 117	DRAINAGE ENGINEERING	4	5	5	6

GENERAL INFORMATION	
Language of Instruction :	English
Level of the Course Unit :	DIPLOMA DEGREE
Type of the Course :	Compulsory
Mode of Delivery of the Course Unit	FACE to FACE
Coordinator of the Course Unit	Alaa Emad Hamid
Instructor(s) of the Course Unit	Alaa Emad Hamid

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.

OBJECTIVES AND CONTENTS	
Objectives of the Course Unit:	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.

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

WEEK	Hours	SUBJECT
1	**2**	**General introduction on drainage of agricultural lands**
2-3	**4**	**Principles of groundwater hydraulics**
4-5	**4**	**Reclamation of saline soils**
6	**4**	**Drainage projects' investigations**
7-8	**2**	**Estimation of soil hydraulic conductivity**
9	**4**	**Drainage systems**
10	**2**	**Design of drains' sections**
11-13	**2**	**Spacing between drains**
14	**6**	**Vertical drainage (drainage wells)**
15	**2**	**Drains' maintenance Drainage and water pollution**

PROFESSIONAL ETHICS PROGRAMME COURSE DESCRIPTION

OBJECTIVES AND CONTENTS	
Objectives of the Course Unit:	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.

Code	Name of the Course Unit	Semester	In-Class Hours	Credit	ECTS Credit
NTU 201	PROFESSIONAL ETHICS	4	2	2	2

GENERAL INFORMATION	
Language of Instruction :	English
Level of the Course Unit :	DIPLOMA DEGREE
Type of the Course :	Compulsory
Mode of Delivery of the Course Unit	FACE to FACE
Coordinator of the Course Unit	Assist. Prof. Abdullah Ahmed Sheikho
Instructor(s) of the Course Unit	Assist. Prof. Abdullah Ahmed Sheikho

- **Course Evaluation**

Evaluation type	Degree
quizzes 2	10

EK	Hours	SUBJECT
1-2	4	Overview of ethical theories (utilitarianism, deontology, virtue ethics) ntroduction to professional ethics and codes of conduct
3-4	4	rameworks for ethical decision-making Case studies and practical applications
5-6	4	Identifying and managing conflicts of interestStrategies for ethical conflict resolution
7-8	4	Ethical considerations and protections for whistleblowersCase studies on whistleblowing
9-10	4	The role of businesses in society Ethical responsibilities of corporations
11-15	8	Business ethics Media ethics Medical ethics Legal ethics Engineering ethics

Term exam	30
Final exam	60
Total	100

Strategy	world case studies to allow students to apply ethical principles an d decision-making frameworks to actual professional dilemmas. Engage students in role- where they must navigate ethical challenges and justify their decisions .

GENERAL INFORMATION	
Language of Instruction :	English
Level of the Course Unit :	BACHELOR'S DEGREE
Type of the Course :	Compulsory
Mode of Delivery of the Course Unit	FACE to FACE
Coordinator of the Course Unit	Assist. Prof. Dr.Abdulnaser Kashmoola
Instructor(s) of the Course Unit	Assist. Prof. Dr.Abdulnaser Kashmoola

EWRT 119	Air Pollution Control	4	0	4	6		
EWRT 120	advance surface Hydrology	5	0	5	6		
EWRT 121	Hydraulics Applications	3	1	4	6		
EWRT 122	Survey Applications	2	3	4	6		
T: Theoretical, P: Practical, C: Credit		17	4	20	20		

Sewers networks PROGRAMME COURSE DESCRIPTION

Code	Name of the Course Unit	Semester	In-Class Hours	Credit	ECTS Credit
EWRT 118	Sewers networks	5	3	3	6

OBJECTIVES AND CONTENTS	
Objectives of the Course Unit:	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 plumping system

WEEK	SUBJECT
1	• Physical, chemical, and biological properties of wastewater
2,3	Components of wastewater flow and wastewater flow rate. Selection of design flow rate and mass loadings.
4	Sewers systems types, sanitary sewers design activities, sanitary sewer types.
5,6	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.
7,8	Sewers network appurtenances: manholes, inverted siphon, outlets and outfalls, alternative sewers systems, lift stations.
9	Inlets: gutter, types of inlets: grate inlet, curb inlet, combination inlet,
10,11,12	Inlets in sag location, inlets spacing. Sanitary sewers software applications. Storm sewers software applications
13,14,15	Plumbing: plumbing code, fixture types, fixture unit, water supply network. Sanitary drainage network. Storm drainage network .

Module Aims, Learning Outcomes and Indicative Contents

Module 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 plumping 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 plumping (ii).

Learning and Teaching Strategies	
Strategies	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.

Student workload (swl)			
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**		

Module Evaluation تقييم المادة الدراسية					
		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
	Assignments	**0**	**0%**		
	Projects / Lab	**1**	**7%**	**13**	CLO-5
	report	**0**	**0%**		
Summative assessment	Midterm Exam	**2HR**	**10%**	**7**	All except CLO-5
	Final exam	**3HR**	**50%**	**16**	All except CLO-5
Total assessment			**100%(100 marks)**		

AIR POLLUTION CONTROL PROGRAMME COURSE DESCRIPTION

Code	Name of the Course Unit	Semester	In-Class Hours (T+P)	Credit	ECTS Credit
EWRT 119	**AIR POLLUTION CONTROL**	**5**	**4**	**4**	**6**

GENERAL INFORMATION	
Language of Instruction:	**English**
Level of the Course Unit :	**BACHELOR'S DEGREE**
Type of the Course :	**Compulsory**
Mode of Delivery of the Course Unit	**FACE to FACE**
Coordinator of the Course Unit	**Assist. Prof Dr. Mohammed Akram Saadi**

GENERAL INFORMATION	
Instructor(s) of the Course Unit	**Assist. Prof Dr. Mohammed Akram Saadi**

OBJECTIVES AND CONTENTS	
Objectives of the Course Unit:	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.

WEEK	SUBJECT
Week 1	Classification of air pollution control equipment.
Week 2	Particles separation technique
Week 3	Gravity settling chamber,
Week 4	Centrifugal separators (cyclones), types and concept
Week 5	Centrifugal separators (cyclones), design procedures
Week 6	Filter baghouse,
Week 7	Electrostatics precipitators.
Week 8	Electrostatics precipitators.
Week 9	Gaseous pollutants control technique
Week 10	Wet scrubber (Venture scrubbers),
Week 11	Absorption,
Week 12	Adsorption
Week 13,14,15	(DeSOx) Flue Gas Desulfurization Control Technologies for Nitrogen Oxides (DeNOx) Control Technologies for Nitrogen Oxides (DeNOx)

Module Aims, Learning Outcomes and Indicative Contents

Module	Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks. CLO-1: Apply the basic principles of engineering and sciences to solve issues associated with air pollution basics and control. (i)

Learning Outcomes مخرجات المادة الدراسية	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)

Learning and Teaching Strategies

Strategies	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.

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**		

Module Evaluation
تقييم المادة الدراسية

		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

	Assignments	**4**	**15%**	3 , 5, 9and 12	CLO-3, CLO-4, CLO-4 CLO-5
	Projects / Lab	**1**	**10%**	**14**	**all**
	report	**---**	**----**	**---**	**-------**
Summative assessment	Midterm Exam	**2HR**	**10%**	**10**	CLO-1, CLO-2, CLO-3, CLO-4, CLO-5
	Final exam	**3HR**	**50%**	**16**	CLO-1, CLO-2, CLO-3, CLO-4, CLO-5
Total assessment			**100%(100 marks)**		

ADVANCED SURFACE HYDROLOGY PROGRAMME COURSE DESCRIPTION

Code	Name of the Course Unit	Semester	In-Class Hours	Credit	ECTS Credit
EWRT 120	**Advanced surface Hydrology**	**5**	**5**	**5**	**6**

GENERAL INFORMATION	
Language of Instruction :	**English**
Level of the Course Unit :	**BACHELOR'S DEGREE**
Type of the Course :	**Compulsory**
Mode of Delivery of the Course Unit	**FACE to FACE**
Coordinator of the Course Unit	**Assist. Prof. Abdullah Ahmed Sheikho**
Instructor(s) of the Course Unit	**Assist. Prof. Abdullah Ahmed Sheikho**

OBJECTIVES AND CONTENTS	
Objectives of the Course Unit:	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

OBJECTIVES AND CONTENTS	
	complete process and analysis of the hydrologic events. This will be achieved through descriptive lectures and supervised tutorials
Contents of the Course Unit:	

WEEK	SUBJECT
1,2,3	• 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.
4,5	• 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,
6,7,8	• 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
9,10	• Types of evaporation meters, reducing evaporation from tanks. • Evapotranspiration, Potential Evapotranspiration Equations, Infiltration, Measurement of Infiltration, Infiltration Capacity Values, Infiltration Indices.

11,12,13	• 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
14,15	Unit Hydrograph Assumptions, Unit Hydrograph Derivation, Unit Hydrograph for Different Duration Flood Routing, Hydrologic Storage Routing, Hydrologic Channel Routing.

Module 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.

Teaching and Learning Strategies	• 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.

Hydraulic applications PROGRAMME COURSE DESCRIPTION

Code	Name of the Course Unit	Semester	In-Class Hours	Credit	ECTS Credit
EWRT 121	Hydraulics Applications	5	4	4	6

GENERAL INFORMATION	
Language of Instruction:	English
Level of the Course Unit:	BACHELOR'S DEGREE
Type of the Course:	Compulsory
Mode of Delivery of the Course Unit	FACE to FACE
Coordinator of the Course Unit	Assist. Prof. Dr.Abdulnaser Kashmoola
Instructor(s) of the Course Unit	Assist. Prof. Dr.Abdulnaser Kashmoola

OBJECTIVES AND CONTENTS	
Objectives of the Course Unit:	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.

WEEK	SUBJECT
1,2	Dimensionless analysis Modelling in pipes and open channel
3	Flow in pipes, general equations
4,5,6	• Laminar and turbulent flow in pipes • Distribution of velocities and shear stress in pipes • Flow in smooth pipes, seventh root law

7,8,9	• Flow in rough pipes • Classification of rough and smooth flow in pipes • Flow in non-circular pipes
10	Minor losses of the fittings, flow in orifice and syphon
11	Connect pipes in parallel and series
12	Branched channel, connection with tanks
13	Hardy- cross method to measure discharge in each pipe of a networks
14,15	Pumps: introduction, connections and efficiency Pumps in parallel and series

Module 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.

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

Survey applications PROGRAMME COURSE DESCRIPTION

Code	Name of the Course Unit	Semester	In-Class Hours	Credit	ECTS Credit
EWRT 122	Survey Applications	5	5	4	6

GENERAL INFORMATION	
Language of Instruction :	English
Level of the Course Unit :	BACHELOR'S DEGREE
Type of the Course :	Compulsory

GENERAL INFORMATION	
Mode of Delivery of the Course Unit	FACE to FACE
Coordinator of the Course Unit	Assist. Prof. Dr. Adnan Abdul Wahab
Instructor(s) of the Course Unit	Assist. Prof. Dr. Adnan Abdul Wahab

OBJECTIVES AND CONTENTS	
Objectives of the Course Unit:	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
Contents of the Course Unit:	

WEEK	SUBJECT
1&2&3&4	• Basic Definitions, Types of Surveying, Units, and conversions • Linear measurements • tape measurements • corrections •
5&6&7	• Leveling definitions and instruments • Leveling methods • Longitudinal and cross-sections
8&9	Contouring Contouring
10&11&12 13&14,15	Theodolites Angles, bearings Coordinates Total Station Surveying GPS principles Vertical Curves

Module Learning Outcomes	Important: Write at least 6 Learning Outcomes, better to be equal to the number of 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)

Learning and Teaching Strategies	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

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		

	Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**

Formative assessment	quizzes	4	20	3, 6, 9and 12	CLO-1, CLO-1, CLO-2, CLO-4
	Assignments	7	10		All
	Project lab				
	Report	10	10		All
Summative assessment	**Midterm Exam**	2hr	10	7	CLO-1, CLO -2 and CLO-3
	Final Exam	3hr	50	16	all
Total assessment			100 %		

evel 3 – Second semester

CODE	TITLE	T	P	C	ECTS	Bologna Content
EWRT 123	ENVIRONMENTAL THERMODYNAMIC	2	1	3	4	
EWRT 124	NUMERICAL ANALYSIS	3	0	3	5	
EWRT 125	REINFORCED CONCRET	3	2	4	5	
EWRT 126	Wastewater Treatment Plant Design	4	1	5	6	
EWRT 127	GROUND WATER HYDROLOGY	5	0	5	4	
EWRT 128	FOUNDATION ENGINEERING	3	2	4	6	
T: Theoritical, P: Practical, C: Credit		20	6	24	30	

Environmental Thermodynamics PROGRAMME COURSE DESCRIPTION

Code	Name of the Course Unit	Semester	In-Class Hours (T+P)	Credit	ECTS Credit
EWRT 123	ENVIRONMENTAL THERMODYNAMIC	6	3	3	4

GENERAL INFORMATION

Language of Instruction:	Arabic
Level of the Course Unit :	BACHELOR'S DEGREE
Type of the Course :	Compulsory
Mode of Delivery of the Course Unit	FACE to FACE
Coordinator of the Course Unit	Dr. Maha Mohammed Taha Hassan
Instructor(s) of the Course Unit	Dr. Maha Mohammed Taha Hassan

OBJECTIVES AND CONTENTS

Objectives of the Course Unit:

- 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 لل ثرموداينامیك 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 رياض ي ا ، 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 والافتراضات التي يجب وضعها.

KEY LEARNING OUTCOMES OF THE COURSE UNIT (On successful completion of this course unit, students/learners will or will be able to:

- 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 المستقر ة
- طريقة انتقال الحرارة
- القدرة على تحديد المشكلات الهندسية المعقدة وتحليلها وحلها وفق ا لمبادئ 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 المختوى ما يلي :
الكميات الأساسية،
- النظام الدولي للوحدات وكتتبة 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.
- تميز 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 المشاك 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 وتطبيقهما -
.انتقال الحرارة بالتوصيل -
.انتقال الحرارة بالحمل الحراري -
انتقال الحرارة بالإشعاع -

WEEK	SUBJECT
1	.المقدمة والأبعاد والوحدة .بعض المفاهيم والتعاريف وأنواع الأنظمة
٢	قياس الضغط ودرجة الحرارة
٣	قوانين الغاز المثالية
٤	ورقة المسائل المحلولة رقم ١ الواجب المنزلي ١ اختبار

٥	امتحان نصف الفصل
٦	قوانين الديناميكا الحرارية / القانون الأول للديناميكا الحرارية العمليات الديناميكية الحرارية - تطبق على عملية النظام المغل
٧	ورقة المسائل المحلولة رقم ٣ الواجب المنزلي ٣ اختبار
٨	عمليات الديناميكية الحرارية - مطبقة على عملية النظام المفتوح
٩	ورقة المسائل المحلولة رقم ٤ الواجب المنزلي ٤ اختبا ر
١٠	طرق انتقال الحرار ة
١١	التطبيق البيئي لنقل الحرار ة
١٢	العمليات متساوية الحرارة وغير متساوية الحرار ة
١٣	ورقة المسائل المحلولة رقم ٥ الواجب المنزلي ٥ اختبار
١٤	الامتحان النهائي للفصل الدراسي

Learning and Teaching Strategies	
Strategies	**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**

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**		

Numerical Analysis PROGRAMME COURSE DESCRIPTION

Code	Name of the Course Unit	Semester	In-Class Hours (T+P)	Credit	ECTS Credit
EWRT 124	NUMERICAL ANALYSIS	6	3	3	5

GENERAL INFORMATION	
Language of Instruction :	English
Level of the Course Unit :	BACHELOR'S DEGREE
Type of the Course :	Compulsory
Mode of Delivery of the Course Unit	FACE to FACE
Coordinator of the Course Unit	Alaa Emad Hamid
Instructor(s) of the Course Unit	Alaa Emad Hamid

OBJECTIVES AND CONTENTS	
Objectives of the Course Unit:	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).

WEEK	hours	WEEK Required Learning Outcomes	Unit or subject name
1	3	Numerical Methods: Iteration and graphical method	Numerical Solution of Algebraic Equations
1	3	Bisection method	**Numerical Solution of Algebraic Equations**
1	3	False position method	**Numerical Solution of Algebraic Equations**
1	3	Newton-Raphson's method	**Numerical Solution of Algebraic Equations**
1	3	Maclaurin series	Numerical Series
4	12	Taylor's series	**Numerical Series**
2	6	Euler's method	**Numerical Series**
2	6	Runge's -Kutta method	**Solution of D.E.**
2	6	Interpolation:Greagory Newton forward interpolation method	**Interpolation**

- **Course Evaluation**

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

Reinforced Concrete PROGRAMME COURSE DESCRIPTION

Code	Name of the Course Unit	Semester	In-Class Hours (T+P)	Credit	ECTS Credit
EWRT 125	REINFORCED CONCRET	6	5	4	5

GENERAL INFORMATION	
Language of Instruction :	English
Level of the Course Unit :	BACHELOR'S DEGREE
Type of the Course :	Compulsory
Mode of Delivery of the Course Unit	FACE to FACE
Coordinator of the Course Unit	Assist. Prof. Dr. Mohammed Akram Saadi
Instructor(s) of the Course Unit	Assist. Prof. Dr. Mohammed Akram Saadi

OBJECTIVES AND CONTENTS	
Objectives of the Course Unit:	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)

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

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

- **Course Evaluation**

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

Wastewater treatment plants design PROGRAMME COURSE DESCRIPTION

Code	Name of the Course Unit	Semester	In-Class Hours	Credit	ECTS Credit
EWRT 126	Wastewater Treatment Plant Design	6	5	5	6

GENERAL INFORMATION	
Language of Instruction :	English
Level of the Course Unit :	BACHELOR'S DEGREE
Type of the Course :	Compulsory
Mode of Delivery of the Course Unit	FACE to FACE
Coordinator of the Course Unit	Dr. Maha Mohammed Taha Hassan
Instructor(s) of the Course Unit	Dr. Maha Mohammed Taha Hassan

OBJECTIVES AND CONTENTS	
Objectives of the Course Unit:	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

WEEK	hours	WEEK Required Learning Outcomes	Unit or subject name
1	4	,Recognize the common physical chemical and biological unit operation sencountered in treatmentprocesses	Introduction, objectives ,general considerationofwastewater treatment plant planning and design
2-3	4	Formulate a design of coarse screen and collection pit	Preliminary unit operation: Screening and collection pit
4	2	Formulate a design of grit chamber	Design of Grit chamber facilities
5	4	Formulate a design of PST	Primary unit operation (PST) Design
6-7	4	Recognize the common unit process of biological treatment	**Fundamentals of biological treatment**
8-11	4	Formulate a design of activated sludge units	Design of suspended growth units: Activated sludge processes and modifications
12	6	Recognize the common features of trickling filter.	**Attached Growth systems: Trickling filter,**
13		Recognize the common features of Simplified Systems of waste water Treatment:	**Simplified Systems of waste water Treatment: Aerated lagoons, Stabilization ponds**
14-15		Formulate a design of grit chamber	**Design of disinfection units: Chlorination, Ozonation, UV disinfection**

Learning and Teaching Strategies	
Strategies	**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.**

- **Course Evaluation**

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

Groundwater Hydrology PROGRAMME COURSE DESCRIPTION

Code	Name of the Course Unit	Semester	In-Class Hours	Credit	ECTS Credit
EWRT 127	GROUND WATER HYDROLOGY	6	5	5	4

GENERAL INFORMATION	
Language of Instruction :	English
Level of the Course Unit :	BACHELOR'S DEGREE
Type of the Course :	Compulsory
Mode of Delivery of the Course Unit	FACE to FACE
Coordinator of the Course Unit	Assist. Prof. Abdullah Ahmed Sheikho
Instructor(s) of the Course Unit	Assist. Prof. Abdullah Ahmed Sheikho

OBJECTIVES AND CONTENTS	
Objectives of the Course Unit:	**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)**

WEEK	hours	WEEK Required Learning Outcomes	Unit or subject name
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
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
5-4	2	Laws of groundwater movement: Darcy's law, hydraulic conductivity, transmissibility. (ii)	Groundwater movement
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
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
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

- **Course Evaluation**

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

14-15	4	Well drilling - penetration speed, diameter, depth, and vibration level. (i)	Drilling wells

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

FOUNDATION ENGINEERING PROGRAMME COURSE DESCRIPTION

Code	Name of the Course Unit	Semester	In-Class Hours	Credit	ECTS Credit
EWRT 128	FOUNDATION ENGINEERING	6	5	4	6

GENERAL INFORMATION	
Language of Instruction :	English
Level of the Course Unit :	BACHELOR'S DEGREE
Type of the Course :	Compulsory
Mode of Delivery of the Course Unit	FACE to FACE
Coordinator of the Course Unit	Assist. Prof. Dr.Abdulnaser Kashmoola

GENERAL INFORMATION	
Instructor(s) of the Course Unit	Assist. Prof. Dr.Abdulnaser Kashmoola

OBJECTIVES AND CONTENTS	
Objectives of the Course Unit:	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.
Contents of the Course Unit:	

KEY LEARNING OUTCOMES OF THE COURSE UNIT (On successful completion of this course unit, students/learners will or will be able to)

WEEK	SUBJECT
1, 2, 3	• 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.
4,5	• 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
6,7,8,9	• 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)
10,11,12	• 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.
13,14	• 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

WORKLOAD & ECTS CREDITS OF THE COURSE UNIT			
Workload for Learning & Teaching Activities			
Type of the Learning Activities	**Learning Activities (# of week)**	**Duration (hours, h)**	**Workload (h)**
Lecture & In-Class Activities	15	4	45
Preliminary & Further Study	2	1	2
Land Surveying	NA	NA	NA
Group Work	NA	NA	NA
Laboratory	NA	NA	NA
Reading	NA	NA	NA
Assignment (Homework)	8	1	8
Project Work	1	5	5
Seminar	3	1	3
Internship	NA	NA	NA
Technical Visit	NA	NA	NA
Web Based Learning	NA	NA	NA
Implementation/Application/Practice	NA	NA	NA
Practice at a workplace	NA	NA	NA
Occupational Activity	NA	NA	NA
Social Activity	NA	NA	NA
Thesis Work	NA	NA	NA
Field Study	NA	NA	NA
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**

Design of Water Treatment Plants PROGRAMME COURSE DESCRIPTION

Code	Name of the Course Unit	Semester	In-Class Hours	Credit	ECTS Credit
EWRT 129	Design of Water Treatment Plants	7	4	3	6

Level 4 – First semester						
CODE	TITLE	T	P	C	ECTS	Bologna Content
EWRT 129	Design of Water Treatment Plants	2	2	3	6	
EWRT 130	Design of Hydraulic Structures I	3	2	4	6	
EWRT 131	Soil and Ground Water Pollution	4	0	4	6	
EWRT 132	Open Channels	3	2	4	5	
EWRT 133	Design of Gravity Irrigation Systems	3	0	3	4	
EWRT 134	Engineering Project I	2	0	2	3	
T: Theoretical, P: Practical, C:Credit		17	6	20	30	

GENERAL INFORMATION	
Language of Instruction :	English
Level of the Course Unit :	BACHELOR'S DEGREE
Type of the Course :	Compulsory
Mode of Delivery of the Course Unit	FACE to FACE

GENERAL INFORMATION	
Coordinator of the Course Unit	Alaa Emad Hamid
Instructor(s) of the Course Unit	Alaa Emad Hamid

OBJECTIVES AND CONTENTS	
Objectives of the Course Unit:	Learn some specific and advance methods in drinking water treatment Learn methods used to treat the residuals from drinking water treatment plants.

Teaching and Learning Strategies	
Strategy	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

- **Course Evaluation**

Evaluation type	Degree
quizzes 5	10
Homework 5	10
Term exam	20

WEEK	Hours	SUBJECT
1-2	4	Chemical precipitation
3-4	4	Ion exchange
5-7	6	Reverse Osmosis
8-9	4	Electrical dialazes
10-15	12	Drinking Water Treatment plant residual management

Final exam	**60**
Total	**100**

Design of Hydraulic Structures PROGRAMME COURSE DESCRIPTION

Code	Name of the Course Unit	Semester	In-Class Hours	Credit	ECTS Credit
EWRT 130	Design of Hydraulic Structures	7	5	4	6

GENERAL INFORMATION	
Language of Instruction :	English
Level of the Course Unit :	BACHELOR'S DEGREE
Type of the Course :	Compulsory
Mode of Delivery of the Course Unit	FACE to FACE
Coordinator of the Course Unit	Assist. Prof. Dr.Abdulnaser Kashmoola
Instructor(s) of the Course Unit	Assist. Prof. Dr.Abdulnaser Kashmoola

OBJECTIVES AND CONTENTS	
Objectives of the Course Unit:	**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**
Teaching and Learning Strategies	

OBJECTIVES AND CONTENTS	
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

WEEK	hours	WEEK Required Learning Outcomes	Unit or subject name
1	4	Classify the hydraulic structures and their uses,	Subject topics - Introduction of types of hydraulic structures
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
6	4	Recognize the components of Protection works of approaches for horizontal floor	Protection works of approaches for horizontal floor
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)
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
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

- **Course Evaluation**

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

Soil and ground water pollution COURSE DESCRIPTION

Code	Name of the Course Unit	Semester	In-Class Hours	Credit	ECTS Credit
EWRT 131	Soil and Ground Water Pollution	7	4	4	6

GENERAL INFORMATION	
Language of Instruction :	English
Level of the Course Unit :	BACHELOR'S DEGREE
Type of the Course :	Compulsory
Mode of Delivery of the Course Unit	FACE to FACE
Coordinator of the Course Unit	Dr. Maha Mohammed Taha Hassan
Instructor(s) of the Course Unit	Dr. Maha Mohammed Taha Hassan

OBJECTIVES AND CONTENTS	
Objectives of the Course Unit:	**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.**

Teaching and Learning Strategies	
Strategy	**rovide 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.**

WEEK	hours	WEEK Required Learning Outcomes
1	4	Overview of soil and groundwater pollution
2-5	16	Physical, chemical, and biological processes affecting pollutant transport
6	4	Techniques for site investigation (e.g., sampling, drilling, coring)
7	4	Concepts of risk assessment
8-10	8	Source-pathway-receptor analysis
11	4	Physical, chemical, and biological remediation methods
12	4	Case studies of remediation projects
13	4	Overview of local, national, and international regulations

14	4	Standards for soil and groundwater quality
15	4	Analysis of real-world case studies

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

Open Channels PROGRAMME COURSE DESCRIPTION

Code	Name of the Course Unit	Semester	In-Class Hours	Credit	ECTS Credit
EWRT 132	Open Channels	7	5	4	5

GENERAL INFORMATION	
Language of Instruction :	English
Level of the Course Unit :	BACHELOR'S DEGREE
Type of the Course :	Compulsory
Mode of Delivery of the Course Unit	FACE to FACE
Coordinator of the Course Unit	Assist. Prof. Dr.Abdulnaser Kashmoola
Instructor(s) of the Course Unit	Assist. Prof. Dr.Abdulnaser Kashmoola

OBJECTIVES AND CONTENTS	
Objectives of the Course Unit:	**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**
Teaching and Learning Strategies	
Strategy	The strategy is to provide theoretical lectures using presentations and question solving in an interactive way with students inside the classroom, as well as tutorials exercises.

WEEK	hours	WEEK Required Learning Outcomes
1	4	Open channel, types and classifications.
2	4	Uniform flow, Chezy and Manning equations.
3	4	Best hydraulic cross section
4-5	8	Consecration of hydraulic radius and Manning coefficient
6	4	Specific energy and critical
7	4	Critical depth with jump or contractions Critical depth with jump or contraction
8-9	8	Hydraulic jump
10	4	Varied flow
11	4	water surface profile
12	4	Weirs and notches
13	4	Second monthly exam
14-15	8	Preparatory week before the final Exam

- **Course Evaluation**

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

Design of Gravity Irrigation Systems COURSE DESCRIPTION

Code	Name of the Course Unit	Semester	In-Class Hours	Credit	ECTS Credit
EWRT 133	Design of Gravity Irrigation Systems	7	3	3	4

GENERAL INFORMATION	
Language of Instruction :	English
Level of the Course Unit :	BACHELOR'S DEGREE
Type of the Course :	Compulsory
Mode of Delivery of the Course Unit	FACE to FACE
Coordinator of the Course Unit	Assist. Prof. Dr. Mohammed Akram Saadi
Instructor(s) of the Course Unit	Assist. ProfDr. Mohammed Akram Saadi

OBJECTIVES AND CONTENTS	
Objectives of the Course Unit:	**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)**
Teaching and Learning Strategies	
Strategy	1. **lectures and Presentations**: Provide foundational knowledge through lectures, covering key concepts, theories, and case studies related to gravity irrigation systems. 2. **Hands- Laboratory Work**: Include practical sessions where students can set up and operate small-scale gravity irrigation models, analyze water flow, and measure efficiency. 3. **Field Trips**: Organize visits to farms or agricultural sites that use gravity irrigation systems to give students real-world exposure and practical insights.

- **Course Evaluation**

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

WEEK	hours	WEEK Required Learning Outcomes
1	4	Introduction to the farm irrigation and the basics of system
2	4	Basic design Factors/Consumptive use/Soil/Irrigation interval and water application depth
3	4	Efficiency ,adequacy ,and uniformity of irrigation
4	4	Water infiltration into soil
5	4	Land grading/Description ,criteria ,and preparatory steps/ Design of land grading/Slopes and field levels
6	4	Earthwork balance and earthwork calculations
7	4	Surface irrigation/Mechanism of surface irrigation process/Infiltration opportunity time and application depth
8	4	Water balance concept in surface irrigation
9	4	Border irrigation system/Assumptions ,considerations ,and limitations of design/Miscellaneous notes
10	4	Design flow rate/Flow depth/Maximum border length/Borde
11	4	Furrow irrigation/Furrow intake characteristics/ Considerations, assumptions, limitations, and design equations
12	4	Runoff control techniques
13	4	Cutback irrigation, Runoff recovery system
14	4	Basin irrigation/ Considerations, assumptions, limitations, and design equations/Booher method
15	4	Final Exam Exam

Engineering Project 1 PROGRAMME COURSE DESCRIPTION

Code	Name of the Course Unit	Semester	In-Class Hours	Credit	ECTS Credit
EWRT 134	Engineering Project 1	7	2	2	3

GENERAL INFORMATION	
Language of Instruction :	English
Level of the Course Unit :	BACHELOR'S DEGREE
Type of the Course :	Compulsory
Mode of Delivery of the Course Unit	FACE to FACE
Coordinator of the Course Unit	Ahmed Azhar Dhnoon
Instructor(s) of the Course Unit	Ahmed Azhar Dhnoon

OBJECTIVES AND CONTENTS	
Objectives of the Course Unit:	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.
Contents of the Course Unit:	

KEY LEARNING OUTCOMES OF THE COURSE UNIT (On successful completion of this course unit, students/learners will or will be able to)

WEEK	SUBJECT
1-14	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.

WORKLOAD & ECTS CREDITS OF THE COURSE UNIT

Workload for Learning & Teaching Activities

Type of the Learning Activities	Learning Activities (# of week)	Duration (hours, h)	Workload (h)
Lecture & In-Class Activities	NA	NA	NA
Preliminary & Further Study	NA	NA	NA
Land Surveying	NA	NA	NA

WORKLOAD & ECTS CREDITS OF THE COURSE UNIT			
Workload for Learning & Teaching Activities			
Type of the Learning Activities	**Learning Activities (# of week)**	**Duration (hours, h)**	**Workload (h)**
Group Work	15	1	15
Laboratory	15	1	15
Reading	NA	NA	NA
Assignment (Homework)	NA	NA	NA
Project Work	1	5	5
Seminar	1	1	1

Level 4 – Second semester

CODE	TITLE	T	P	C	ECTS	Bologna Content
EWRT 135	Engineering Project Management and Economy	4	0	4	5	
EWRT 136	Design of Irrigation and Drainage Networks	4	0	4	5	
EWRT 137	Design of Sprinkler and Drip Irrigation	4	2	5	7	
EWRT 138	Design of Hydraulic Structures II	3	1	4	5	
EWRT 139	Estimation and Specifications	3	1	4	5	
EWRT 140	Engineering project 2	2	0	2	3	
T:Theoretical, P:Practical, C:Credit		*20*	*4*	*23*	*30*	

Engineering Project Management and Economy PROGRAMME COURSE

Code	Name of the Course Unit	Semester	In-Class Hours	Credit	ECTS Credit
EWRT 135	Engineering Project Management and Economy	8	4	4	5

GENERAL INFORMATION	
Language of Instruction :	English
Level of the Course Unit :	BACHELOR'S DEGREE
Type of the Course :	Compulsory
Mode of Delivery of the Course Unit	FACE to FACE
Coordinator of the Course Unit	Assist. Prof. Dr.Abdulnaser Kashmoola
Instructor(s) of the Course Unit	Assist. Prof. Dr.Abdulnaser Kashmoola

OBJECTIVES AND CONTENTS	
Objectives of the Course Unit:	**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**
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.

WEEK	hours	WEEK Required Learning Outcomes
1	4	Water Resources Economy Principles of Engineering Economics Cash Flow Diagram (i)
2-3	8	Uniform Annual Series Uniform Gradient Series Nominal and Effective Interest Rates (i Payback Period: Simple Payback – Discounted payback
4-5	8	Present Worth (PW) Method (ii)
6-7	8	Future Worth (FW)Method
8-10	12	Annual Worth (AW) Method (ii)
11	4	Benefit/Cost Ratio Method (ii)
12-15	16	Project Pricing. Progress Payments.Cash Flow Forecasting(i)

- **Course Evaluation**

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

Design of irrigation and drainage networks

Code	Name of the Course Unit	Semester	In-Class Hours	Credit	ECTS Credit
EWRT 136	Design of Irrigation and Drainage Networks	8	4	4	5

GENERAL INFORMATION	
Language of Instruction :	English
Level of the Course Unit :	BACHELOR'S DEGREE
Type of the Course :	Compulsory
Mode of Delivery of the Course Unit	FACE to FACE
Coordinator of the Course Unit	Alaa Emad Hamid
Instructor(s) of the Course Unit	Alaa Emad Hamid

OBJECTIVES AND CONTENTS	
Objectives of the Course Unit:	**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**
Teaching and Learning Strategies	
Strategy	**The strategy is to provide theoretical lectures using presentations and question solving in an interactive way with students inside the classroom, as well as tutorials exercises.**

- **Course Evaluation**

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

WEEK	hours	WEEK Required Learning Outcomes
1	4	Learn about Naming and numbering
2	4	irrigation and drainage networks
3	4	Learn layout of irrigation and drainage networks on contour maps
4-5	8	Learn water supply systems
6-7	8	Learn calculating Discharge for different Irrigation systems
8-9	8	Learn design of earth Canal using general Design method
10	4	Learn drawing ground Profiles for canal networks
11	4	Learn drawing ground Profiles for drainage networks
12	4	Learn drawing the Synoptic diagram For canals
13	4	Learn drawing ground Profiles for drain networks
14	4	Learn drawing the Synoptic diagram For drains
15	4	Final Exam Exam

Design of Sprinkler and Drip Irrigation Systems

Code	Name of the Course Unit	Semester	In-Class Hours	Credit	ECTS Credit
EWRT 137	Design of Sprinkler and Drip Irrigation	8	6	5	7

GENERAL INFORMATION	
Language of Instruction :	English
Level of the Course Unit :	BACHELOR'S DEGREE
Type of the Course :	Compulsory
Mode of Delivery of the Course Unit	FACE to FACE
Coordinator of the Course Unit	Assist. Prof. Abdullah Ahmed Sheikho
Instructor(s) of the Course Unit	Assist. Prof. Abdullah Ahmed Sheikho

OBJECTIVES AND CONTENTS	
Objectives of the Course Unit:	**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**
Teaching and Learning Strategies	
Strategy	**1. Lectures and Presentations: Deliver lectures covering the principles, co mponents, and design criteria of sprinkler and drip irrigation systems.** **2. Hands-on Workshops: Conduct workshops where students can design and asse mble small-**

OBJECTIVES AND CONTENTS	
	scale sprinkler and drip systems, learning about component integration and system performance. **3. Field Visits: Arrange trips to sites employing advanced sprinkler and dri p irrigation systems for practical observation and understanding.**

WEEK	hours	WEEK Required Learning Outcomes
1	4	**Sprinkler irrigation** **Sprinkler irrigation basic concept** **Advantages and problems of sprinkler irrigation** **Basic and supplementary components Types of sprinkler irrigation systems**
2	4	**Fundamentals of sprinkler irrigation** **Single sprinkler water distribution** **Layout of stationary system/Hydraulic of sprinkler nozzle**
3	4	**Uniformity of sprinkler water distribution**
4	4	**Alternate setting of sprinkler laterals** **Sprinkler spray losses** **sprinkler irrigation efficiency**
5	4	**Sprinkler lateral pipes** **Fundamentals of flow hydraulic pipes** **Allowable pressure variation /Sprinkler pipe size**
6	4	**Friction head loss/Layout of sprinkler pipes** **Moving and operation sprinkler pipes** **Sprinkler pipe material**
7	4	**Sprinkler irrigation major pipes distribution system** **Types of major pipes distribution system** **Design requirements/ Distribution system layout**
8	4	**Design methods (flow velocity method, allowable friction method, economic analysis method)**
9	4	**Economic analysis general procedure** **Total dynamic head**
10	4	**Applications on design of main pipe systems**
11	4	**Trickle irrigation** **Advantages and problems of drip irrigation** **Trickle system basic component** **Soil-water-crop factor**
12	4	**Emitters selection/Hydraulic of trickle network**
13	4	**General notes about evaluation of on- farm irrigation systems**
14	4	**Applications of Drip Irrigations**
15	4	**Final Exam**

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

Design of Hydraulic Structures II PROGRAMME COURSE

Code	Name of the Course Unit	Semester	In-Class Hours	Credit	ECTS Credit
EWRT 138	Design of Hydraulic Structures II	8	4	4	5

GENERAL INFORMATION	
Language of Instruction :	English
Level of the Course Unit :	BACHELOR'S DEGREE
Type of the Course :	Compulsory
Mode of Delivery of the Course Unit	FACE to FACE
Coordinator of the Course Unit	Assist. Prof. Dr. Adnan Abdul Wahab
Instructor(s) of the Course Unit	Assist. Prof. Dr. Adnan Abdul Wahab

OBJECTIVES AND CONTENTS	
Objectives of the Course Unit:	**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).**

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.**

Estimation and Specific PROGRAMME COURSE DESCRIPTION

- **Course Evaluation**

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

Code	Name of the Course Unit	Semester	In-Class Hours	Credit	ECTS Credit
EWRT 139	Estimation and Specifications	8	4	4	5

GENERAL INFORMATION	
Language of Instruction :	English
Level of the Course Unit :	BACHELOR'S DEGREE
Type of the Course :	Compulsory
Mode of Delivery of the Course Unit	FACE to FACE
Coordinator of the Course Unit	Assist. Prof. Dr. Mohammed Akram Saadi
Instructor(s) of the Course Unit	Assist. Prof. Dr. Mohammed Akram Saadi

EK	hours	WEEK Required Learning Outcomes
1-5	20	Develop the ability of the students to solve design problems and analyze the data to evaluate the feasibility of components of the canal headwork (barrage types). In addition, assess and analyze the safety of the canal headwork structure (barrage types).
6-7	8	Develop the ability of the students to solve the design problems and analyze the data to evaluate some types of flow transition
8-10	12	Develop the ability of the students to solve design problems and analyze the data to evaluate the cross drainage works, (Design example of syphon).
11-14	16	Develop the ability of the students to solve the design of the culvert
15	4	Develop and solve the design of the canal falls (Sharda-type fall).

OBJECTIVES AND CONTENTS	
Objectives of the Course Unit:	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**

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

WEEK	hours	WEEK Required Learning Outcomes
1	3	**Introduction to Estimation and Materials Specification,** **Introduction; syllabus; Draw (house plan).**
2	3	**Excavation of Foundations** **Excavation of stripe and raft foundation, draw (elevations, sectional elevation, foundation plan, wall section).**
3-4	6	**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).**
5	3	**Cubed wall works Cubed wall works and estimation of materials**
6-8	9	**Walls stone building, bricks building, block building. Bricks building estimation of materials** **Block building, estimation of materials**
9-10	6	**Wood form works** **estimation of materials for wood form types**
11	3	**Design of drains' sections**
12-13	6	**Reinforced** **estimation of materials for reinforced of slab.** **Reinforced of beams** **estimation of materials for reinforced of beams, draw (reinforced of Structural construction**
14-15	6	**Finishing works** **Estimation of materials for finishing works**

- **Course Evaluation**

Evaluation type	Degree
2 Quizzes	**8**
2 Assignments	**8**
Monthly Exam	**10**

Term Exam	**14**
Final Exam	**60**
Total	**100**

INOVATIVE PROJECT-II PROGRAMME COURSE DESCRIPTION

Code	Name of the Course Unit	Semester	In-Class Hours	Credit	ECTS Credit
EWRT 140	INOVATIVE PROJECT- II	8	4	2	2

GENERAL INFORMATION	
Language of Instruction :	English
Level of the Course Unit :	BACHELOR'S DEGREE
Type of the Course :	Compulsory
Mode of Delivery of the Course Unit	FACE to FACE
Coordinator of the Course Unit	Alaa Emad Hamid
Instructor(s) of the Course Unit	Alaa Emad Hamid

OBJECTIVES AND CONTENTS	
Objectives of the Course Unit:	The student will be able to design, calculate quantities, plot the architectural, constructional, sanitary, & electrical plans & details for a certain project in civil engineering.
Contents of the Course Unit:	

KEY LEARNING OUTCOMES OF THE COURSE UNIT (On successful completion of this course unit, students/learners will or will be able to)	
WEEK	SUBJECT
1-14	Different projects supervised by staff members.

WORKLOAD & ECTS CREDITS OF THE COURSE UNIT			
Workload for Learning & Teaching Activities			
Type of the Learning Activities	**Learning Activities (# of week)**	**Duration (hours, h)**	**Workload (h)**
Lecture & In-Class Activities	NA	NA	NA
Preliminary & Further Study	NA	NA	NA
Land Surveying	NA	NA	NA
Group Work	NA	NA	NA
Laboratory	NA	NA	NA
Reading	NA	NA	NA
Assignment (Homework)	NA	NA	NA
Project Work	1	10	10
Seminar	1	5	5
Internship	NA	NA	NA
Technical Visit	14	1	14
Web Based Learning	NA	NA	NA
Implementation/Application/Practice	NA	NA	NA
Practice at a workplace	14	2	28
Occupational Activity	NA	NA	NA
Social Activity	NA	NA	NA
Thesis Work	1	5	5
Field Study	NA	NA	NA
Report Writing	1	1	1
Final Exam	NA	NA	NA
Preparation for the Final Exam	NA	NA	NA
Mid-Term Exam	NA	NA	NA
Preparation for the Mid-Term Exam	NA	NA	NA
Short Exam	NA	NA	NA
Preparation for the Short Exam	NA	NA	NA
TOTAL	**32**	**24**	**63**
Total Workload of the Course Unit			**63**
Workload (h) / 27			**2.3**
ECTS Credits allocated for the Course Unit			**2**