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

Academic Program and Course Description Guide

2025

Academic Program Specification Form for Colleges and Institutions

University: Northern Technical University

College / Institute: Technical Institute / Mosul

Department: Environment and Water Resources Technologies

Date of Form Completion: 4 / 2/ 2025

Dean's Assistant For Scientific Affairs

Date: 4 / 2/2025 Signature

Dr.Maha Mohamed Taha Hasen

Head of Department

Date: 4/ 2 /2025

Quality Assurance and University Performance Manager

Date: / 5 /2 /2025

Signature

Dr. Abdulnaser Abdulrazzaq Ahmed

Dean

1. Program vision
The vision of the department is to be a leader and pioneer in the field of modern environmental and water resources 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

2. Program message
The mission of the department is to provide the work fields with distinguished technicians in the field of water resources engineering in a way that serves development plans and contributes effectively to the implementation of engineering projects , providing scientific advice, preparing economic feasibility studies and irrigation project designs , publishing 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

3. Program objectives
.1 Graduating specialized technical cadres in the field of water resources (irrigation and .(drainage projects and water operation projects .2 Developing methods to improve the properties of water resources to meet future water .needs

.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, identifying expected engineering problems, and finding optimal solutions before implementation using . modern engineering software

.5 Providing the graduate with practical skills in monitoring and organizing irrigation works, determining irrigation water needs, carrying out irrigation and drainage projects, and . installing, operating and maintaining modern irrigation systems

4. Program accreditation
nothing

5. Other external influences
nothing

* comments	Study unit	Number of courses	Program Structure
basic, 2 7 optional	**18**	**9**	University requirements
basic 6	**22**	**8**	Institute Requirements
basic, 4 20 optional	**72**	**24**	Department Requirements
	-------	**Completed**	Summer training

		no There is	Other

.Notes may include whether the course is basic or optional *

6. Program Description				
My working hours	My theoretical hours	Course name	Course code	Year/Level
2	1	Engineering mechanics	WRTI138	**First / 2025 - 2024**
2	2	Principles of Fluid Mechanics	WRTI122	
2	2	Irrigation principles	WRTI135	
3	2	Introduction to space	WRTI128	
3	0	Engineering drawing	MIT102	
0	2	mathematics	MIT100	
0	2	English language	NTU101	
1	1	Computer	NTU102	
0	2	human rights	NTU100	
2	2	Microscopic revival	WRTO124	
2	1	Quantity survey	WRTI2 40	**/ 2025 - 2024**
2	1	Surface water hydrology	WRTI2 4 2	**Second**

2	1	Drip irrigation techniques	WRTI2 4 8	
3	1	Hydraulic installations	WRTI2 4 4	
2	1	drainage network planning	WRTI2 4 6	
2	1	Soil investigations	WRTI2 5 0	
---	2	Arabic	NTU103	
---	2	English language	NTU200	
2	---	Project 2	WRTI2 3 3	

7. Teaching and learning strategies
The instructor explains the theoretical material on the board using the smart screen and data show device, paper lectures, educational bags, summer training in related departments and .engineering projects

8. Evaluation methods
Daily, semester and final tests, weekly reports

:Teaching staff schedule- 17

Current Angel	Subspecialty	General specialization	Academic title	Certificate	Births	Full name	T
Technical Institute/ Mosul	botany	Philosophy in Life Sciences	Teacher	PhD	1979	Dr. Maha Mohamed Taha Hassan	1
Technical Institute/ Mosul	Civil Engineering	Civil Engineering	assistant professor	PhD	1980	Dr. Mohammad Akram Saadi	2
Technical Institute/ Mosul	Irrigation and drainage engineering	Science in Irrigation and Drainage Engineering	assistant professor	Master's	1963	Abdullah Ahmed Shekho	3
Technical Institute/ Mosul	Civil Engineering	Civil Engineering	assistant professor	PhD	1973	Dr. Adnan Abdul Wahab Ismail	
Technical Institute/ Mosul	Irrigation and drainage	Irrigation and drainage engineering	Lecturer	Master's	1978	Ahmed Azhar Sins	4
Technical Institute/ Mosul	Irrigation and drainage	Science in Water Resources Engineering	Lecturer	Master's	1982	Alaa Emad Hamid	5
Technical Institute/ Mosul	Hydrology	Dam and Water Resources Engineering	Assistant Lecturer	Master's	1986	Rana Mohammed Abdel	6
Technical Institute/ Mosul	Science in Environmental Science	Science in Environmental Science	Assistant Lecturer	Master's	1993	Bushra Zidan Khalil	7

: Technical and administrative staff table- 18

Current Angel	Specialization	Job Title	Certificate	Three-part name	T
Technical Institute/ Mosul	Office management	Technical Director	diploma	Asmaa Ibrahim Shaker	1
Technical Institute/ Mosul	Mechanics	Chief Technical Observer	diploma	Ismat Arif Mohammed	2
Technical Institute/ Mosul	Water resources	Technical trainer	Bachelor's	Ahmed Mohammed Saadi	3
Technical Institute/ Mosul	space	Assistant Engineer	Bachelor's	Athir Hashim Ismail	4
Technical Institute/ Mosul	Computer Science	Assistant Engineer	Bachelor's	Safaa Abdel Moheb Abdel Qader	5
Technical Institute/ Mosul	Water resources	Assistant Engineer	Bachelor's	Marwa Khairy Majeed	6
Technical Institute/ Mosul	Translation etiquette	Assistant translator	Bachelor's	Ihsan Essam Ghazi	7
Technical Institute/ Mosul	Water resources	New appointment	diploma	Faris Farhan Wahb	8
Technical Institute/ Mosul	Water resources	New appointment	diploma	QutoofHussein Ali	9

Professional development
Orientation of new faculty members
Professional development for faculty members

9. Acceptance Criteria
-The student's acceptance criteria are based on central acceptance within the ministry's plan, the .student's branch in middle school, his grade point average, and his desire

10. The most important sources of information about the program
Lieutenant – External sources (Internet)- Scientific research and its latest developments- Methodological books-

11. Program development plan
1- .addition Information on all topics Specializing in anesthesia and intensive care .Identifying modern scientific developments -2 .Participation in international and local conferences -3 .Participation in scientific workshops inside and outside Iraq -4 Hosting scientific competencies in the field of specialization -5

First / First level First semester

Course code	Number of hours Practical	Theoretical hours	Number of units	Course name	T
WRTI138	2	1	3	Engineering mechanics	1
WRTI122	2	2	4	Principles of Fluid Mechanics	2
WRTI135	2	2	4	Irrigation principles	3
WRTI128	3	2	5	Introduction to space	4
MIT102	3	0	3	Engineering drawing	5
MIT100	0	2	2	mathematics	6
NTU101	0	2	2	English language	7
NTU102	1	1	2	Computer	8
NTU100	0	2	2	human rights	9
WRTO124	2	2	4	Microscopic revival	10
	15	16	31	Total units	

Second / First level, second semester

Course code	Number of hours Practical	Theoretical hours	Number of units	Course name	T
NTU 104	---	2	2	Arabic	1
MIT101	3	----	3	Mechanics lab	2
MIT103	----	2	2	Calculus	3
WRTI136	2	2	4	Applications in irrigation	4
WRTI123	2	2	4	Fluid Mechanics Applications	5
WRTI129	2	3	5	Space applications	6

WRTI137	2	1	3	material resistance	7
WRTO120	2	2	4	Health chemistry	8
WRTO223	2	1	3	Health drawing	9
	15	15	30	Total units	

Third / Second level, first semester

Course code	Number of hours Practical	Theoretical hours	Number of units	Course name	T
WRTI2 4 1	2	1	3	Introduction to Hydrology	1
WRTI2 4 3	3	1	4	Irrigation and drainage networks	2
WRTI2 4 5	2	1	3	Introduction to puncture	3
WRTI2 4 7	2	1	3	Sprinkler irrigation techniques	4
WRTI2 4 9	2	1	3	Basics of soil mechanics	5
WRTI2 5 1	2	1	3	Construction materials	6
NTU201	---	2	2	Professional ethics	7
WRTI221	2	1	3	Computer 1	8
	---	2	2	Baath Party Crimes	9
WRTI2 3 3	2	---	2	Project 1	10
	17	11	28	Total units	

Fourth / Second level, second semester

Course code	Number of hours Practical	Theoretical hours	Number of units	Course name	T
WRTI2 40	2	1	3	Quantity survey	1

WRTI2 4 2	2	1	3	Surface water hydrology	2
WRTI2 4 8	2	1	3	Drip irrigation techniques	3
WRTI2 4 4	3	1	4	Hydraulic installations	4
WRTI2 4 6	2	1	3	drainage network planning	5
WRTI2 5 0	2	1	3	Soil investigations	6
NTU103	---	2	2	Arabic	7
NTU200	---	2	2	English language	8
WRTI2 3 3	2	---	2	Project 2	9
	13	11	24	Total units	

Program Skills Chart															
Required learning outcomes of the program															
Values				Skills				Knowledge				Essential or ?optional	Course name	Course code	Year / Level
Part 4	Part 3	Part 2	A1	B 4	B 3	B 2	B 1	A4	A3	A2	A 1				
		/			/				/				Engineering mechanics	WRTI138	2024-2025 First /
		/					/			/			Principles of Fluid Mechanics	WRTI122	
		/					/	/			/		Irrigation principles	WRTI135	
		/					/				/		Introduction to Survey	WRTI128	
		/					/				/		Engineering drawing	MIT102	
													mathematics	MIT100	
			/				/				/		English language	NTU101	
			/				/				/		Computer	NTU102	
		/				/					/		human rights	NTU100	

			/				/				/		Microscopic revival	WRTO124	
			/				/				/		Arabic	NTU 104	
			/				/				/		Mechanics lab	MIT101	
			/				/				/		Calculus	MIT103	
			/				/				/		Applications in irrigation	**WRTI136**	2024- 2025 / Second
		/					/				/		Fluid Mechanics Applications	**WRTI123**	
		/					/				/		Survey applications	**WRTI129**	
		/					/				/		Strength of materials	**WRTI137**	
		/					/				/		Health chemistry	**WRTO120**	
		/	/				/				/		Health drawing	**WRTO223**	
		/	/				/				/		Introduction to Hydrology	WRTI2 4 1	
		/	/				/				/		Irrigation and drainage networks	WRTI2 4 3	
		/	/				/				/		Introduction to Drainage	WRTI2 4 5	

		/	/				/				/		Sprinkler irrigation techniques	WRTI2 4 7	
		/	/				/				/		Basics of soil mechanics	WRTI2 4 9	
		/	/				/				/		Construction materials	WRTI2 5 1	
		/	/				/				/		Professional ethics	NTU201	
		/	/				/				/		Computer 1	WRTI221	
		/	/				/				/		Baath Party Crimes		
		/	/				/				/		Project 1	WRTI2 3 3	
		/	/				/				/		Quantity survey	WRTI2 40	
		/	/				/				/		Surface water hydrology	WRTI2 4 2	

Mathematics 1						**Course name:**
Environmental and Water Resources Technologies						**Section:**
Mosul Technical Institute						**College:**
the first						**Stage/Level**
the first						**Semester:**
0	practical	2	theoretical			**Number of weekly hours:**
2						**:Number of academic units**
TIMO110						**:Code**
	Both of them		practical	✓	theoretical	**Material type**
Yes				**Is there a counterpart to the course in other ?departments**		
Mathematics 1						**Name of the corresponding course**
All Technology Sections						**Section**
TIMO110						**Course code counterpart**
Subject teaching information						
Alaa Emad Hamid						**course Name of the : teacher(s)**
Teacher						**:Academic title**
						Year of obtaining the title
Master's						**:Certificate**
						Year of obtaining the certificate

18	**Number of years of experience (teaching)**

Number of weekly hours				First academic year	**Mathematics (1)**	In Arabic	Name of the material
Number of units	the total	practical	theoretical		**Mathematics (1)**	In English	
2	2	----	2	Level 1, First Semester (Compulsory lessons (		Language of instruction for the subject	

Theoretical vocabulary

Vocabulary details	**The week**

Definition of Function Logarithmic And the Asian Trigonometry Function - and graphing functions	1
Goals - Goals of Algebraic Functions The water is gone	2
Vectors - Vector Analysis - Scalar and Vector Quantities	4-3
and applications in the fields of Problems in the analysis of forces and moments - irrigation	5
Derivatives - Application in Irrigation, Power Analysis and Surveying	6
Derivatives of basic functions and Logarithmic and trigonometric	7
Differentiation - Chain Rule and Position Problems	8
Implicit Functions - Higher Order Derivatives	9
Tangent equation, maximum and minimum limits of a function , and inflection points	10
Differential applications in irrigation field speed and acceleration	11
Integration - for Algebraic Functions	12
Integration of logarithmic, exponential and trigonometric functions	13
Definite Integration - Applications to Different Functions	14
Area Under a Curve - Area Between Two Curves with Applications in Irrigation	15

General description of the course

Developing the student's ability to use mathematics in practical applications and benefit from it in other technical lessons and teaching the student different methods of representing .equations and mathematical laws in computer fields

General objectives

- The student will gain a comprehensive understanding of basic concepts in mathematics, such as numbers, arithmetic operations, algebra, geometry, and statistics.
- **Develop problem solving skills**:
- The student improves his ability to solve mathematical problems in logical and systematic ways.
- The student applies mathematical techniques and tools to solve complex problems in a variety of contexts.
- **Acquiring analytical thinking skills**:
- To develop the student's ability to think critically and analytically using mathematics .
- The student analyzes problems and breaks them down into smaller parts to understand and solve them more effectively.

Specific objectives

Understanding and analyzing algebra:

- The student solves algebraic equations and inequalities.
- The student will understand and apply algebraic laws such as the laws of multiplication and distribution, and addition and subtraction of algebraic expressions.

Study and application of engineering concepts:

- The student understands the basics of geometry such as geometric shapes, angles, triangles, and rectangles.
- The student applies engineering laws to calculate areas and volumes.

Understanding and applying analysis concepts:

- The student learns how to deal with mathematical functions and equations.
- The student studies derivatives of functions, their integration, and their application in differential and integral calculus problems.

Application of the principles of statistics and probability:

- The student should understand the basics of statistics such as averages, standard deviations, and distributions.
- The student studies the principles of probability and how to calculate probabilities for certain variables.

Analysis and study of systems of equations:

- The student solves systems of linear and nonlinear equations.
- The student should apply solution methods such as the substitution method and the deletion method.

Understanding and analyzing functions and variables:

- The student studies different types of functions such as linear functions and quadratic functions.
- The student analyzes the properties of functions such as maximum and minimum values, and increasing and decreasing.

Behavioral objectives or learning outcomes

The learning outcomes of a mathematics course specify the skills and knowledge that students are expected to acquire upon successful completion of the course. These outcomes focus on developing skills in analysis, application, and reasoning in mathematics. Here are some common learning outcomes for a mathematics course:

1. **Understanding basic mathematical concepts**:
   - The student should learn the basic principles of mathematics such as numbers, arithmetic operations, algebra, geometry, calculus, and statistics.
   - The student understands how to apply these concepts in different contexts.
2. **Develop problem solving skills**:

   The student should be able to analyze mathematical problems and apply appropriate solution strategies.
   - The student uses different mathematical methods to solve complex problems and interpret the results clearly.
3. **Mastering Algebra and Equations**:

- The student solves algebraic equations and inequalities of varying levels of complexity.
- The student understands and applies the laws of algebra and analyzes algebraic expressions.

4. **Understanding and analyzing engineering concepts**:
   - The student studies geometric shapes, angles , areas, and volumes.
   - The student applies geometric laws to calculate areas and volumes and understand the properties of geometric shapes.
5. **Application of analysis and differential and integral calculus**:
   - The student will use the principles of differential and integral calculus in analyzing functions and calculating derivatives and integrals.
   - The student applies analytical techniques to solve practical problems and interpret the results.
6. **Application of the principles of statistics and probability**:
   - The student analyzes data using statistical tools such as averages, standard deviations, and distributions.
   - The student calculates the probabilities of events and uses statistical principles to interpret data.
7. **Solving systems of equations**:
   - The student will solve systems of linear and nonlinear equations using different techniques such as substitution and elimination.
   - The student understands the applications of systems of equations in real-world problems.

Prerequisites

- **The student must be familiar with arithmetic operations and how to deal with . trigonometric functions**

Evaluation mechanism	Behavioral objectives or basic learning outcomes	
Daily, monthly and end of course exams	**Understanding and applying analysis concepts**:	T
Daily, monthly and end of course exams	Learn how to deal with mathematical functions and equations .	**1**
Daily, monthly and end of course exams	Study of derivatives of functions, their integration and their application in differential and integral calculus problems.	**2**
Daily, monthly and end of course exams	**Application of the principles of statistics and probability** :	**3**
Daily, monthly and end of course exams	Understand the basics of statistics such as means, standard deviation, and distributions.	**4**

Teaching Methods (Select a variety of teaching methods to suit student needs and (course content

Reasons for selection	style or method
Theoretical course	**1. Theoretical lectures**
	2.
	.3
	.4
	.5
	.6

Health drawing	**Course name:**
Environmental and Water Resources Technologies	**Section:**
Mosul Technical Institute	**College:**
the first	**Stage/Level**
the first	**Semester:**
2 practical 1 theoretical	**Number of weekly hours:**
3	**:Number of academic units**
WRTO223	**:Code**
✓ Both of them practical theoretical	**Material type**
Is there a counterpart to the course in other ?departments	
	Name of the corresponding course
	Section
	Course code counterpart
Subject teaching information	
	course Name of the : teacher(s)
	:Academic title
	Year of obtaining the title
	:Certificate
	Year of obtaining the certificate
	Number of years of experience (teaching)

General description of the course: Health Drawing

Sanitary drawing is a course usually taught in engineering schools, especially in the disciplines of civil engineering, sanitary engineering and environmental engineering. The course aims to provide students with the basic skills to draw and design sanitary systems in buildings, such as water, sewage and ventilation systems.

Main topics in the course:

1. **Introduction to health drawing**
    - Definition and importance of health drawing.
    - Types of sanitary plans (water, sewage, ventilation plans).
    - Symbols and terms used in health drawing.
2. **Water distribution systems**

:General objectives of the health drawing course

Sanitary Drawing course aims to provide students with the knowledge and skills necessary to understand and design sanitary systems in buildings, with an emphasis on theoretical and practical foundations. The following are the general objectives of the course:

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1. Theoretical understanding of health and engineering foundations

- Introducing students to the basics of water, sanitation and ventilation systems in buildings.
- Identifying the internationally and locally approved health standards and requirements .
- Understand the impact of healthy design on the health and safety of users.

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2. Developing health engineering drawing skills

- Learn to read and analyze health charts.
- Mastering the drawing and planning of water, drainage and ventilation systems using traditional engineering tools and modern software.
- Identify the symbols and terms used in health drawing.

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3. .Acquire skills in designing water and sanitation systems

- Designing cold and hot water supply networks in a correct and effective manner.
- Drawing and planning of sewage and wastewater disposal systems.
- Design of rainwater drainage and sanitary ventilation solutions for buildings.

4. Use of engineering software in health drawing

- **AutoCAD** application Or other programs in preparing health plans accurately.
- Producing executive health plans that comply with building standards.
- Coordinating and documenting health plans in a professional manner.

Specific objectives of the health drawing course

In addition to the general objectives, there are a set of **specific objectives** that focus on the skills and knowledge that the student will acquire during the study of the course. These objectives include:

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1. Mastering the skills of manual and electronic health drawing

- Learn to draw health system diagrams manually using traditional engineering tools.
- Mastering**AutoCAD** Or engineering drawing programs to prepare health plans accurately and professionally.
- Distinguish between types of health plans (planning, executive, three-dimensional).

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2. Understanding different water supply and drainage systems

- Understanding the mechanisms of water distribution within residential, commercial and industrial buildings.
- Design of cold and hot water systems, and identification of system components (tanks, (pumps, pipes, valves.
- Draw details of water pipe extensions and clearly show the feeding points.

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3. Design of drainage and storm water systems

- Identify the types of wastewater (grey, black) and design appropriate drainage networks for each type.
- Drawing the paths of sewer pipes and determining the locations of inspection chambers and traps.
- Design of rainwater drainage systems and calculation of flow rates and appropriate slopes of pipes.

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4. .Applying health code standards and requirements in design

- Identifying the international and local health codes approved in the design of health systems(**IPC, UPC, Saudi Building Code, Egyptian Code, etc.**).
- Ensure compliance with standards related to pressure, flow, ventilation, and protection of water sources.
- Compare different systems according to engineering code requirements and determine the best for each case.

Health Drawing Course Learning Outcomes

Learning outcomes are the knowledge and skills that a student is expected to acquire after successfully completing a **health drawing course** . These outcomes can be divided into **cognitive, skill, and value-based** as follows:

:FirstCognitive Learning Outcomes

◇ **Understanding the basics of health drawing:**

- Understand the basic concepts related to water, sanitation and ventilation systems.
- Identify the symbols and technical terms used in health drawing.
- Understanding the relationship between health systems and the rest of the building systems (structural, architectural, electrical).

◇ **Familiarity with sanitary design standards and codes:**

- Knowledge of codes and regulations governing the design of health systems (such as **IPC, UPC, Egyptian Code, Saudi Building Code**).
- Understanding public health and safety requirements in the design of water and sewage networks.
- Analysis of health problems in buildings according to engineering code standards.

◇ **Learn about health systems technologies and materials:**

- Knowing the types of pipes and materials used in water and drainage networks.
- Understand the basic principles of designing pumps, tanks, valves and sanitary traps.
- Familiarity with healthy ventilation systems and their impact on indoor air quality.

Second: PracticalSkills Learning Outcomes

🛠 **Mastering the skills of sanitary engineering drawing:**

- Ability to read and analyze health charts.

- Drawing water, drainage and ventilation plans manually using traditional engineering tools.
- Use of engineering drawing programs such as**AutoCAD** To prepare health plans accurately and professionally.

🛠 **Design and planning of sanitary systems for buildings:**

- Design of cold and hot water networks according to usage requirements.
- Proper planning of drainage and rainwater drainage systems.
- Calculate diameters and pressures in pipe networks based on expected flow.

Health Chemistry	**Course name:**
Environmental and Water Resources Technologies	**Section:**
Mosul Technical Institute	**College:**
the first	**Stage/Level**
the first	**Semester:**
2 practical 2 theoretical	**Number of weekly hours:**
4	**:Number of academic units**
WRTO120	**:Code**
✓ Both of them practical theoretical	**Material type**
Is there a counterpart to the course in other ?departments	
	Name of the corresponding course
	Section
	Course code counterpart
Subject teaching information	
Dr. Heba Mashaal	**course Name of the : teacher(s)**
	:Academic title
	Year of obtaining the title
	:Certificate
	Year of obtaining the certificate
	Number of years of experience (teaching)

الفصل الاول من المحتوى العلمي							
عنوان الفصل	الوقت						
التوزيع الزمني	النظري	العملي	العنوان الفرعي		طريقة التدريس	التقنيات	طرق القياس
الأسبوع الأول			مقدمة عن المقرر ، أهداف التعلم، محتوى المقرر		محاضرة	عرض تقديمي، شرح، أسئلة وأجوبة, مناقشة	
الأسبوع الأول	1		المحاذير التي يجب ملاحظتها عند جمع العينات	طريقة تجميع العينات , المحاليل القياسية	محاضرة ومناقشة	عرض تقديمي , شرح, أسئلة وأجوبة	واجبات وتكاليف وامتحان شفهي
			طرق تجميع العينات		محاضرة ومناقشة	عرض تقديمي , شرح, أسئلة وأجوبة	واجبات وتكاليف وامتحان شفهي
			البيانات التي يجب كتابتها على قناني الجمع		محاضرة ومناقشة	عرض تقديمي , شرح, أسئلة وأجوبة	واجبات وتكاليف وامتحان شفهي
			تعريف المحاليل القياسية		محاضرة ومناقشة	عرض تقديمي , شرح, أسئلة وأجوبة	واجبات وتكاليف وامتحان شفهي
الأسبوع الثاني	1		درجة الحرارة	الخصائص الطبيعية	محاضرة ومناقشة	عرض تقديمي , شرح, أسئلة وأجوبة	واجبات وتكاليف وامتحان شفهي
			فحص اللون		محاضرة ومناقشة	عرض تقديمي , شرح, أسئلة وأجوبة	واجبات وتكاليف وامتحان شفهي
			العكارة		محاضرة ومناقشة	عرض تقديمي , شرح, أسئلة وأجوبة	واجبات وتكاليف وامتحان شفهي
الاسبوع الثالث	1		تعاريف	المواد العالقة والقابلة للترسيب والذائبة	محاضرة ومناقشة	عرض تقديمي , شرح, أسئلة وأجوبة	واجبات وتكاليف وامتحان شفهي
			حسابات تتعلق بالمادة العالقة		محاضرة ومناقشة	عرض تقديمي , شرح, أسئلة وأجوبة	واجبات وتكاليف وامتحان شفهي
					محاضرة ومناقشة	عرض تقديمي , شرح, أسئلة وأجوبة	واجبات وتكاليف وامتحان شفهي

الفصل الثاني							
عنوان الفصل	الوقت						
التوزيع الزمني	النظري	العملي	العنوان الفرعي		طريقة التدريس	التقنيات	طرق القياس
الأسبوع الرابع	1		تعريف التسحيح	الحامضية والقلوية وتركيز الأيون الهيدروجين	محاضرة ومناقشة	عرض تقديمي , شرح, أسئلة وأجوبة	واجبات وتكاليف وامتحان شفهي
			الدلائل		محاضرة ومناقشة	عرض تقديمي , شرح, أسئلة وأجوبة	واجبات وتكاليف وامتحان شفهي
			القاعدية والحامضية		محاضرة ومناقشة	عرض تقديمي , شرح, أسئلة وأجوبة	واجبات وتكاليف وامتحان شفهي
			طرق المعايرة		محاضرة ومناقشة	عرض تقديمي , شرح, أسئلة وأجوبة	واجبات وتكاليف وامتحان شفهي
					محاضرة ومناقشة	عرض تقديمي , شرح, أسئلة وأجوبة	واجبات وتكاليف وامتحان شفهي
الأسبوع الخامس	1		انواع المياه العسرة	العسرة والكالسيوم ، اهميته وتعينه بطريقة التسحيح	محاضرة ومناقشة	عرض تقديمي , شرح, أسئلة وأجوبة	واجبات وتكاليف وامتحان شفهي
			تأثير العسرة		محاضرة ومناقشة	عرض تقديمي , شرح, أسئلة وأجوبة	واجبات وتكاليف وامتحان شفهي
			طرق ازالة العسرة وانواعها		محاضرة ومناقشة	عرض تقديمي , شرح, أسئلة وأجوبة	واجبات وتكاليف وامتحان شفهي

الفصل الثالث							
عنوان الفصل	الوقت						
التوزيع الزمني	نظري	عملي	العنوان الفرعي		طريقة التدريس	التقنيات	طرق القياس
الاسبوع السادس	1		الهالوجينات وطرق تعينها الكلوريد	انواع الهالوجينات	محاضرة ومناقشة	عرض تقديمي , شرح, أسئلة وأجوبة	واجبات وتكاليف وامتحان شفهي
				تواج الكلوريدات وتأثيرها	محاضرة ومناقشة	عرض تقديمي , شرح, أسئلة وأجوبة	واجبات وتكاليف وامتحان شفهي
				طرق ازالة الكلوريدات	محاضرة ومناقشة	عرض تقديمي , شرح, أسئلة وأجوبة	واجبات وتكاليف وامتحان شفهي
					محاضرة ومناقشة	عرض تقديمي , شرح, أسئلة وأجوبة	واجبات وتكاليف وامتحان شفهي
					محاضرة ومناقشة	عرض تقديمي , شرح, أسئلة وأجوبة	واجبات وتكاليف وامتحان شفهي
الاسبوع السابع	1		الايوديد وتعينها بطريقة leuco crystal violet	تأثير الايوديد	محاضرة ومناقشة	عرض تقديمي , شرح, أسئلة وأجوبة	واجبات وتكاليف وامتحان شفهي
				شرح طريقة البلورات البنفسجية	محاضرة ومناقشة	عرض تقديمي , شرح, أسئلة وأجوبة	واجبات وتكاليف وامتحان شفهي

الفصل الرابع (من المحتوى العلمي)							
عنوان الفصل	الوقت						
التوزيع الزمني	نظري	عملي			طريقة التدريس	التقنيات	طرق القياس
الاسبوع الثامن	1		الاوكسجين المذاب والاوكسجين الحيوي المطلوب وحساباته	تعاريف	محاضرة ومناقشة	عرض تقديمي , شرح, أسئلة وأجوبة	واجبات وتكاليف وامتحان شفهي
				فروقات	محاضرة ومناقشة	عرض تقديمي , شرح, أسئلة وأجوبة	واجبات وتكاليف وامتحان شفهي
				مضار ومنافع كل نوع	محاضرة ومناقشة	عرض تقديمي , شرح, أسئلة وأجوبة	واجبات وتكاليف وامتحان شفهي
				حسابات	محاضرة ومناقشة	عرض تقديمي , شرح, أسئلة وأجوبة	واجبات وتكاليف وامتحان شفهي
					محاضرة ومناقشة	عرض تقديمي , شرح, أسئلة وأجوبة	واجبات وتكاليف وامتحان شفهي
الاسبوع التاسع	1		المخاصر الثقيلة وتعين الرصاص بطريقة ثنائي الدايزون	تعاريف	محاضرة ومناقشة	عرض تقديمي , شرح, أسئلة وأجوبة	واجبات وتكاليف وامتحان شفهي
				طرق تقدير العناصر	محاضرة ومناقشة	عرض تقديمي , شرح, أسئلة وأجوبة	واجبات وتكاليف وامتحان شفهي
				الحسابات	محاضرة ومناقشة	عرض تقديمي , شرح, أسئلة وأجوبة	واجبات وتكاليف وامتحان شفهي

الفصل الرابع (من المحتوى العلمي)								
عنوان الفصل	الوقت							
التوزيع الزمني	نظري	عملي			طريقة التدريس	التقنيات	طرق القياس	الجامعة
الاسبوع العاشر	1		النشادر واكاسيد الحديد	وجود الامونيا	محاضرة ومناقشة	عرض تقديمي , شرح, أسئلة وأجوبة	واجبات وتكاليف وامتحان شفهي	
				نسبة الحديد	محاضرة ومناقشة	عرض تقديمي , شرح, أسئلة وأجوبة	واجبات وتكاليف وامتحان شفهي	
				طرق التقدير للحديد	محاضرة ومناقشة	عرض تقديمي , شرح, أسئلة وأجوبة	واجبات وتكاليف وامتحان شفهي	
				حسابات	محاضرة ومناقشة	عرض تقديمي , شرح, أسئلة وأجوبة	واجبات وتكاليف وامتحان شفهي	
لاسبوع الحادي عشر	1		الكبريتات والكبريتيد	تعاريف	محاضرة ومناقشة	عرض تقديمي , شرح, أسئلة وأجوبة	واجبات وتكاليف وامتحان شفهي	
				طرق التقدير الكبريت	محاضرة ومناقشة	عرض تقديمي , شرح, أسئلة وأجوبة	واجبات وتكاليف وامتحان شفهي	
لاسبوع الثاني عشر	1		المواصفات القياسية لمياه الشرب	الخواص الطبيعية	محاضرة ومناقشة	عرض تقديمي , شرح, أسئلة وأجوبة	واجبات وتكاليف وامتحان شفهي	
				مواد غير عضوية لها تأثير على الأستساغة والاستخدامات المنزلية	محاضرة ومناقشة	عرض تقديمي , شرح, أسئلة وأجوبة	واجبات وتكاليف وامتحان شفهي	
				الالكانات المكلورة	محاضرة ومناقشة	عرض تقديمي , شرح, أسئلة وأجوبة	واجبات وتكاليف وامتحان شفهي	

الفصل الرابع (من المحتوى العلمي)							
عنوان الفصل	الوقت						
التوزيع الزمني	نظري	عملي	العناوين الرئيسية	العناوين الفرعية	طريقة التدريس	التقنيات	طرق القياس
الأسبوع					محاضرة	عرض تقديمي، شرح، أسئلة وأجوبة, مناقشة	
الاسبوع الثالث عشر	1		التاكسد والاختزال	العامل المؤكسد	محاضرة ومناقشة	عرض تقديمي , شرح, أسئلة وأجوبة	واجبات وتكاليف وامتحان شفهي
				العامل المختزل	محاضرة ومناقشة	عرض تقديمي , شرح, أسئلة وأجوبة	واجبات وتكاليف وامتحان شفهي
				امثلة ومعادلات	محاضرة ومناقشة	عرض تقديمي , شرح, أسئلة وأجوبة	واجبات وتكاليف وامتحان شفهي
الاسبوع الرابع عشر	1		العناصر الثقيلة وتعين الرصاص بطريقة تنائي الثايزون	تعاريف	محاضرة ومناقشة	عرض تقديمي , شرح, أسئلة وأجوبة	واجبات وتكاليف وامتحان شفهي
				طرق تقدير العناصر	محاضرة ومناقشة	عرض تقديمي , شرح, أسئلة وأجوبة	واجبات وتكاليف وامتحان شفهي
				الحسابات	محاضرة ومناقشة	عرض تقديمي , شرح, أسئلة وأجوبة	واجبات وتكاليف وامتحان شفهي
الاسبوع الخامس عشر	1		التكتيل والمكتيلات وانواعها	تعاريف انواع التكتيلات	محاضرة ومناقشة	عرض تقديمي , شرح, أسئلة وأجوبة	واجبات وتكاليف وامتحان شفهي
					محاضرة ومناقشة	عرض تقديمي , شرح, أسئلة وأجوبة	واجبات وتكاليف وامتحان شفهي

General description of the Health Chemistry course

Health Chemistry is a course that aims to introduce students to the basic principles of chemistry related to public health and the environment, with an emphasis on the effects of chemicals on human health and the environment. The course includes the study of chemical reactions in biological systems, water and air quality, toxic substances and their effects, and the use of chemistry in water and wastewater treatment.

📌 General description of the Health Chemistry course

The Health Chemistry course aims to provide students with basic knowledge about chemical applications in health and environmental fields, with an emphasis on the role of chemistry in maintaining human health and the environment. The course covers the study of **chemical reactions in biological systems, water and air quality, toxic chemicals and their effects, and water and wastewater treatment technologies**. It also highlights the use of chemistry in the fields of disinfection and sterilization, food safety, and the environmental effects of chemical pollutants.

🎯 General objectives of the Health Chemistry course

The Health Chemistry course aims to provide students with scientific knowledge and applied skills related to chemistry and its impact on public health and the environment. The course focuses on the role of chemistry in analyzing the quality of water, air and soil, understanding chemical reactions in the human body, in addition to studying the effect of toxic chemicals, and the use of chemical processes in water and sewage treatment, disinfection and sterilization .

◇ General objectives of the course

1️⃣Understand the basic principles of health chemistry

✔ Learn the basic concepts in general, organic and inorganic chemistry related to health.

✔ Understanding the role of chemistry in vital processes within the human body and the effect of chemicals on it.

2️⃣Study the effect of chemicals on health and the environment

✔ Analyze how chemical pollutants affect human health and ecosystems.

✔ Identify the health risks resulting from exposure to toxic and carcinogenic substances.

✔ Applying chemical safety standards and reducing the risks of harmful substances.

3️⃣ Water, air and soil quality assessment

✔ Understanding the chemical and physical properties of water resources.

✔ Study of water analysis techniques to detect chemical and biological pollutants.

✔ Analysis of air and soil quality and the impact of pollutants on them.

4️⃣ Application of chemical processes in water and wastewater treatment

✔ Study of chemical methods used in water purification and removal of pollutants.

✔ Understanding chemical reactions in wastewater treatment plants.

✔ Application of chemical principles in environmental detoxification and pollution removal techniques.

5️⃣ Use of chemistry in disinfection, sterilization and food safety

✔ Learn about the types of disinfectants and chemical sterilizers and their uses in the medical and health fields.

✔ Understand the role of chemistry in food preservation and safety, and prevent chemical contamination in the food industry.

6️⃣ Enhance chemical analysis and evaluation skills

✔ Developing the ability to conduct chemical analyses of water, air and soil.

✔ Gaining skills in using chemical devices in health and environmental laboratories.

✔ Applying scientific methods to detect chemical pollutants and assess their health risks.

7️⃣ Promoting environmental and health awareness and taking preventive measures

✔ Understand the importance of preserving the environment and reducing chemical pollution .

✔ Develop critical thinking skills in assessing chemical risks and making appropriate decisions.

✔ Encouraging sustainable practices to protect public health and the environment.

🎯 Specific objectives of the Health Chemistry course

The specific objectives of the Health Chemistry course aim to achieve specific and in-depth learning outcomes that enable students to apply chemical concepts in the fields of public health and the environment. These objectives address the cognitive, skill and application aspects, helping students understand the effects of chemicals on health and the use of chemical processes in prevention, treatment and treatment of pollutants.

◇ **Specific objectives of the course**

1. Understand basic chemical concepts related to health

- ✔ Understand the basic principles of general, organic and inorganic chemistry in a health context.
- ✔ Learn about the basic chemical reactions inside the human body and their role in vital functions.
- ✔ Study the effect of acids, bases, heavy metals and organic compounds on health.

2. Water, air and soil quality analysis

- ✔ Understanding the chemical and physical properties of water and their impact on public health.
- ✔ Learn about methods of analyzing water quality and measuring chemical and biological pollutants.
- ✔ Analysis of air and soil quality and study of the impact of chemical pollution on them.

3. Study of toxic chemicals and their health effects

- ✔ Classification of toxic and carcinogenic chemicals according to their risks to human health .
- ✔ Analysis of the effect of chronic and acute exposure to chemical pollutants on body functions.
- ✔ Studying ways to reduce exposure to harmful substances and limit their health effects.

4. Application of chemical processes in water and wastewater treatment

- ✔ Study of chemical reactions used in water purification and pollutant removal processes.
- ✔ Understand the methods of sedimentation, oxidation, coagulation, and sterilization in water and wastewater treatment plants.
- ✔ Use of chemical analysis to evaluate the efficiency of treatment techniques.

5. Use of chemistry in disinfection and sterilization processes

✔ Learn about the different types of disinfectants and chemical sterilizers used in the health sector.

✔ Study the mechanism of action of chlorine, ozone, hydrogen peroxide, and alcohol in eliminating microbes.

✔ Applying health standards to use disinfectants in a safe and effective manner.

6. Application of chemical principles in food safety

✔ Learn about food additives and their effects on human health.

✔ Study of chemical reactions in food and the effect of preservation methods on its composition.

✔ Analysis of the impact of chemical contamination of food and water on public health.

📌 Health Chemistry Course Learning Outcomes

Health Chemistry course aims to develop students' knowledge and applied skills in the field of chemistry and its impact on health and the environment. After successful completion of the course, students will be able to:

◇ :FirstCognitive Learning Outcomes

☑ Understanding basic chemical concepts

- Learn the basic principles of general, organic and inorganic chemistry related to health .
- Explaining chemical reactions in the human body and their effect on vital functions.

☑ Analysis of the impact of chemicals on health and the environment

- Explain the impact of chemical pollutants on human health and ecosystems.
- Classification of toxic and carcinogenic chemicals according to their health and environmental risks.
- Understand the role of chemistry in water and wastewater treatment and air and soil quality analysis.

☑ Application of chemical concepts in public health areas

- Study the role of chemicals in food safety and chemical reactions in preservation and sterilization processes.
- Analyzing chemical hazards in industrial and medical environments and taking appropriate preventive measures.

◇ **:SecondSkills Learning Outcomes**

☑ **Conducting chemical analyses of water, air and soil**

- Use of laboratory methods to determine chemical and biological pollutants in water, air and soil.
- Application of chemical methods such**as spectroscopy** And **chromatography** In the detection of harmful substances.

☑ **Application of chemical processes in water and wastewater treatment**

- Evaluating water quality and the ability to choose the most appropriate chemical methods for treatment.
- Use of chemical principles in the processes of sedimentation, oxidation, coagulation, and sterilization to purify water.

☑ **Chemical risk assessment and preventive measures**

- Analysis of the effects of exposure to toxic substances on human health using chemical and biological data.
- Applying chemical safety standards to reduce the risks of environmental and industrial pollutants.

☑ **Using chemistry in disinfection and sterilization processes**

- Choosing the appropriate chemical disinfectants and sterilizers for different health environments.
- Understand the mechanisms of action of disinfectants such as chlorine, ozone, hydrogen peroxide, and alcohol.

M	A	N	weekly hours	System : Courses	All scientific branches
2	1	1			
Computer Applications				Stage one	Computer vocabulary 1
The objective of the course : To teach the student the components of the computer and study the Windows XP system. Its commands and windows, then enter the andAutoCAD drawing program and learn about the program interface, drawing and editing commands , and writing .commands , then learn about the concept of viruses and ways to treat them					

Vocabulary details	The week
) Introduction to computers: generations, componentshardware andsoftware (	First - Second
Windows XP : Operating SystemWindows concept , advantages, ,basic requirements, system operationdesktop main screen components , icon conceptIcons how to deal with mouse activities , , the importance and components of the task bar, usingstart to enter programs , the conceptof loaded tasks, exiting the system and .turning off the calculator	the third
The concept of a window for any program and identifying its main components , dealing withRecycle bin ,my computer ,my Documents	Fourth
Format disks Flexible, copy folders and files, take advantage of cut .and paste and learn properties of disks , folders and files	Fifth
Benefit fromControl Panel programs such as the icon :mouse icon , display and how to change the library background, control the screen saver, change the appearance and colors of window menus , iconRemove prog. ,add in add And delete programs	Sixth
Take advantage of theRun option to execute programs directly and learn how to get thehelp assistant. And its different methods	Seventh
- Use entertainment programs such asMedia player. Window In movie playback -) Take advantage of add -onsAccessories such (as the Calculator - Dealing withpaint programs in Create , save and retrieve . drawings through the commands provided by	The eighth

- Dealing withthe Note pad andWord pad windows in writing, saving, retrieving, printing, and changing the printing style and .formatting of texts	
AutoCAD2004 Learn about the program's working environment / and ways toaccess it Commands and Directions, save and open files	Ninth
:Commands HelpUnits, Drawing limits	
) Methods of selecting and choosing objectsCrossing , window, pick box (	
CommandsPOLAR/OTRAK / LWT / ORTHO / OSNAP / GRID / SNAP The order Distance And the matter Area .	tenth
: View Tools) The Zoom) command and its options, the (Pan) command and its options, how tozoom ,Pan at the same time The orderRegen .in fee adjustment	eleventh
Basic drawing commandsDraw :Line ,Multiline ,Construction line ,Polyline Polygon ,Rectangle ,Arc ,Circle ,Revcloud ,Spline , Ellipse ,Make block ,Insert block ;,Point ,Hatch ,Region .	12th - 15th

Computer1						**Course name:**
Environmental and Water Resources Technologies						**Section:**
Mosul Technical Institute						**College:**
the first						**Stage/Level**
the first						**Semester:**
1	practical	1	theoretical			**Number of weekly hours:**
2						**:Number of academic units**
NTU102						**:Code**
✓	Both		practical		theoretical	**Material type**
Yes				**Is there a counterpart to the course in other ?departments**		
						Name of the corresponding course
						Section
						Course code counterpart
Subject teaching information						
Ahmed Azhardhannoon						**course Name of the : teacher(s)**
Teacher						**:Academic title**
						Year of obtaining the title
Master's						**:Certificate**
						Year of obtaining the certificate
18						**Number of years of experience (teaching)**

:General description of the course

Calculator 1 is an introductory course usually taught in engineering and science colleges, and aims to introduce students to the basics of computing and programming. The course focuses on basic computer principles, algorithms, and simple data structures, as well as

General objectives of the Calculation 1 course

Calculator 1 course aims to provide students with the basic knowledge and skills in computing and programming, helping them understand how computers work and program them effectively. The main objectives include:

1. **Understanding the basics of computing:**
   - Learn about computer components and their basic functions.
   - Understand how data is represented inside the computer (binary and decimal (systems.
   - Understand the role of operating systems in managing computer resources.
2. **Develop analytical thinking and problem solving:**
   - Learn how to analyze problems and design logical solutions using algorithms.
   - Use flowchartsto illustrate the solution steps.
3. **Mastering the basic concepts of programming:**
   - Familiarize yourself with the programming language used in the course(such asC ,Python or ,Java).
   - Use variables, arithmetic operations, and control structures (conditions and (iterations.
   - Learn about functions and arrays to organize data and programming operations .
4. **Developing practical programming skills:**
   - Write and implement simple programs to solve various problems.

Specific objectives of Calculation 1 course

In addition to the general objectives, the course focuses on achieving specific objectives related to acquiring detailed skills and knowledge in the fields of computing and programming. Specific objectives include the following:

1. **Familiarity with computer basics and programming:**
   - Identify the hardware and software components of the computer and their functions.

- Understand how data is represented within a computer (binary numbers, (number systems, and textual representation.
- Understand the role of operating systems in operating and managing computer resources.

2. **Developing problem analysis and solution design skills:**

- Formulate and analyze problems in a logical way.

Learning outcomes for Calculation 1 course

After successfully completing **Calculation 1 , the student is expected to achieve the following outcomes**:

1. Knowledge and understanding

- ☑ Understand the basic concepts of the computer, its components, and how it works.
- ☑ Knowing how to represent data inside the computer (binary and decimal systems and (converting between them.
- ☑ Understand the basics of operating systems and their role in managing computer resources .
- ☑ Learn the basic principles of programming, such as variables, arithmetic operations, and control structures.

Irrigation principles	**Course name:**
Environmental and Water Resources Technologies	**Section:**
Mosul Technical Institute	**College:**
the first	**Stage/Level**
the first	**Semester:**
2 practical 2 theoretical	**Number of weekly hours:**
4	**:Number of academic units**
WRTI135	**:Code**
✓ Both of them practical theoretical	**Material type**
both	**Is there a counterpart to the course in other ?departments**
	Name of the corresponding course
	Section
	Course code counterpart
Subject teaching information	
Rana Mohammed Abdel	**course Name of the : teacher(s)**
AssistantLecturer	**:Academic title**
	Year of obtaining the title
Master's	**:Certificate**
	Year of obtaining the certificate
5	**Number of years of experience (teaching)**

General description of the course

Introducing the student to the methods of delivering water and using it to irrigate agricultural lands and acquiring the skills necessary to implement an irrigation project and its irrigation systems and how to implement them

General objectives

Application of water management concepts:

- The student learns how to manage water efficiently to reduce waste and improve water use in agriculture.
- The student applies water management techniques such as storage, distribution, and water flow control.

Specific objectives

Understanding the basics of irrigation:

- The student will learn about the basic irrigation concepts and the importance of irrigation in agriculture.
- The student will understand the scientific principles that govern the movement of water in the soil and how it affects crop growth.

Knowledge of irrigation techniques and systems:

- The student should study the different types of irrigation systems such as drip irrigation, sprinkler irrigation, and surface irrigation.
- The student will understand how to design and apply irrigation systems appropriate to different types of crops and soil conditions.

Behavioral objectives or learning outcomes

1.

- The student learns how to design irrigation systems that meet the special needs of the farmer and are compatible with environmental conditions.

- The student will use engineering programs and tools to plan and design irrigation systems.

2. **Evaluating the effectiveness of irrigation systems**:
   - The student evaluates the effectiveness and efficiency of different irrigation systems by analyzing the system performance and crop results.
   - The student will learn about ways to improve and update irrigation systems based on evaluations and results.
3. **Dealing with soil and water issues**:
   - The student will understand the effect of irrigation on soil properties such as cohesion, aeration, and root growth.
   - The student will deal with issues such as salinization and water pollution and how to address these problems.
4. **Promoting environmental awareness**:
   - The student understands the effects of irrigation on the environment and how to reduce the negative environmental impact.
   - The student applies sustainable irrigation techniques to conserve water resources and protect the environment.
5. **Develop research and analysis skills**:
   - The student develops research and analysis skills to identify the latest trends and technologies in the field of irrigation.
   - The student analyzes studies and practical cases to apply the acquired knowledge on the ground.
6. **Application of practical knowledge**:
   - The student applies theoretical and practical principles in preparing technical reports and solving problems related to irrigation in different agricultural environments.
   - To train the student on field work and experience in designing and implementing irrigation projects.

These objectives help students acquire the knowledge and skills necessary to understand and apply irrigation principles efficiently, enhancing their ability to manage water in agriculture effectively and sustainably.

Prerequisites

- **nothing**

Evaluation mechanism	Behavioral objectives or basic learning outcomes	
and practical exam and weekly reports	**Application of water management concepts**:	T
and practical exam and weekly reports	Learn how to manage water efficiently to reduce waste and improve water use in agriculture.	**1**
and practical exam and weekly reports	Application of water management techniques such as storage, distribution, and water flow control.	**2**
and practical exam and weekly reports	**Estimation of crop water requirements**:	**3**
and practical exam and weekly reports	Calculating the water requirements of different crops based on variables such as crop type, growth stage, and weather conditions.	**4**

Teaching Methods (Select a variety of teaching methods to suit student needs and (course content

Reasons for selection	style or method
Theoretical + practical course	**3. Theoretical lectures**
	4. Practical application
	.3
	.4
	.5
	.6

Number of weekly hours				First academic year	**Irrigation principles**	In Arabic	Name of the material
Number of units	the total	practical	theoretical		Irrigation **(1)**	In English	
4	4	2	2	Level 1, First Semester (Compulsory (lessons	Arab	Language of instruction for the subject	

Theoretical vocabulary

Vocabulary details	**The week**
Irrigation science , its definition, the benefits of irrigation, an idea about the types of irrigation	1
Soil, physical properties of soil, types of water in soil, soil water retention capacity, soil classification	3-2
Field capacity , wilting point, saturation, available and unavailable water	4
Soil moisture and methods of measuring it	5
Water seepage and infiltration, soil-soil relationship, irrigation water preparation	7-6
Water consumption and methods of measuring it	9-8
Water rationing, irrigation depth calculation , determining the number and periods of irrigation, irrigation efficiency	11-10
Calculating sections for open channels and drainages using equations ((Manninck , Chezy, Darcy, optimal hydraulic section	13-12
Field surveys for irrigation and drainage projects, general planning of irrigation and drainage networks	15-14

Practical Vocabulary

Vocabulary details	**The week**
Showing films and slides of Abdul Ray	**1**
Experiment to determine the apparent and true density of soil	**2**

Experiment to determine soil porosity	**3**
Solving problems about the physical properties of soil	**4**
Solving problems about field capacity and tail point	**5**
Experiment to measure moisture content by laboratory method	**6**
Experiment to measure moisture content by field methods	**7**
An experiment to estimate the rate of water infiltration in soil	**8**
Solving problems about water consumption	**9**
Solving problems about water rationing and calculating the number of irrigations	**11 - 10**
Calculating sections for open channels using different equations	**13-12**
planning Irrigation and drainage networks on contour maps	**15-14**

2D engineering drawing						**Course name:**
Environmental and Water Resources Technologies						**Section:**
Mosul Technical Institute						**College:**
the first						**Stage/Level**
the first						**Semester:**
3	practical	0	theoretical			**Number of weekly hours:**
3						**:Number of academic units**
WRTI126						**:Code**
	Both of them	✓	practical		theoretical	**Material type**
Yes				**Is there a counterpart to the course in other ?departments**		
Engineering drawing						**Name of the corresponding course**
						Section
						Course code counterpart
Subject teaching information						
Ahmed Azhar Sins						**course Name of the : teacher(s)**
Teacher						**:Academic title**
2013						**Year of obtaining the title**
Master's						**:Certificate**
2002						**Year of obtaining the certificate**

18	**Number of years of experience (teaching)**

General description of the course

Teaching the student the basics and rules of engineering drawing using the AutoCAD programfor engineering .drawing on the computer

General objectives

- to use the analysis tools in The student learnsAutoCAD to review and audit drawings and ensure their accuracy and compliance with engineering standards.
- The student should make the necessary modifications and improve the overall quality of the drawings.

Applying knowledge in practical projects:

- The student must useAutoCAD. In implementing practical projects that require drawing and designing various engineering drawings.
- The student develops problem-solving skills by applying the program's tools in real-life projects.

Enhancing collaboration and productivity skills:

- The student learns how to exchange drawings and collaborate with colleagues by using the copy, share, and review tools inAutoCAD.
- The student improves productivity by applying effective work methods and time management.
- The student explores the program's capabilities to apply advanced design techniques and improve perceptions.

Specific objectives

Master the basics ofAutoCAD :

- The student learns how to use the program interface, basic tools, and main commands .
- The student will understand how to set up the work environment, manage files, and adjust the basic settings of the program.
- The student uses basic drawing tools such as lines, geometric shapes, circles, and rectangles to create accurate drawings.
- The student learns how to use editing tools to change and improve engineering drawings.

Create 2Dgraphics :

- The student designs and creates two-dimensional engineering drawings such as floor plans, facades, and sections.
- The student will understand how to use layersto organize graphics and improve their clarity.

Behavioral objectives or learning outcomes

- **Organizing files**: The student learns how to manage and store drawing files in an organized manner.
- **Print Preparation**: The student learns how to prepare graphics for printing and format them according to printing requirements and standards.

Application of analysis and audit tools:

- **Quality Analysis**: The student uses the analysis tools inAutoCAD to review the drawings and verify their accuracy.
- **Error checking**: The student must identify Corrects errors or inconsistencies in engineering drawings.

Dealing with blocks and external references:

- **Creating Blocks:** The student learns how to create and use blocks to repeat shapes and symbols in drawings.
- **Inserting external references(Xrefs)** : The student uses external references to combine and format multiple drawings.

Collaborate and share graphics:

- **Collaborating with others**: The student learns how to exchange drawings and collaborate with colleagues throughAutoCAD files.
- **Project Sharing**: Students use sharing and commenting tools to improve interaction and collaboration between teams.

Prerequisites

- **The student must be familiar with arithmetic operations and solving . equations**

Evaluation mechanism	Behavioral objectives or basic learning outcomes	
Daily, monthly and end of course practical exams	**Create geometric shapes**: Use basic drawing tools such as lines, rectangles, circles, and ovals to draw precise shapes.	T
Daily, monthly and end of course practical exams	**Edit graphics**: Apply editing tools such as stretch, crop, and rotate to change shapes and enhance graphics.	**1**
Daily, monthly and end of course practical exams	**Application of dimensional and observation techniques**:	**2**
Daily, monthly and end of course practical exams	**Adding dimensions**: Use dimension tools to add precise measurements to drawings and clarify geometric dimensions.	**3**
Daily, monthly and end of course practical exams	**Inserting notes and labels**: Learn how to add text and explanatory notes to make information more clear.	**4**

Teaching Methods (Select a variety of teaching methods to suit student needs and (course content

Reasons for selection	style or method
Practical course	**5. Lectures and practical**
	6. Preparing drawing boards in AutoCAD
	.3
	.4
	.5
	.6

Number of weekly hours				First academic year	**Engineering) drawing2D (**	In Arabic	Name of the material
Number of units	the total	practical	theoretical		**Engineering drawing(2D)**	In English	
3	3	3	----	Level 1, First Semester (Compulsory (lessons		Language of instruction for the subject	

Practical Vocabulary

Vocabulary details	**The week**
Importance of engineering drawing-Applying AutoCAD in engineering drawing -Measurement of drawing sheet-Overview of AutoCAD window.	1
Types of lines in engineering drawing- Use of pull-down menus for lines and texts.	2
Drawing of basic objects.	4 – 3
Modifying of drawings – Use of status bar.	6 – 5
Drawing operations – Dimensioning – Applications.	9 – 8 – 7
Isometric drawing – Drawing a shape containing a square, rectangle, circle and triangle.	13-12-11-10
Theory of projection – Orthographic projection for simple shapes.	15 - 14

Principles of Fluid Mechanics						**Course name:**
Environmental and Water Resources Technologies						**Section:**
Mosul Technical Institute						**College:**
the first						**Stage/Level**
the first						**Semester:**
2	practical	2	theoretical			**Number of weekly hours:**
4						**:Number of academic units**
WRTI122						**:Code**
✓	Both of them		practical		theoretical	**Material type**
both				**Is there a counterpart to the course in other ?departments**		
						Name of the corresponding course
						Section
						Course code counterpart
Subject teaching information						
Alaa Emad Hamid						**course Name of the : teacher(s)**
Teacher						**:Academic title**
						Year of obtaining the title
Master's						**:Certificate**
						Year of obtaining the certificate

18	**Number of years of experience (teaching)**

General description of the course

Teaching the student the effect of fluids in the state of motion and stability and their relationship to the discharges of open and closed channels and determining the required pump capacity and choosing them to benefit from them in irrigation sites and other related sites

General objectives

Application of fluid mechanics principles in engineering design:

- The student will use the principles of fluid mechanics to design and analyze systems such as pumps, fans, and heat exchangers.
- The student will apply these principles to improve the efficiency of systems and machines that depend on fluid flow.

Analyzing practical problems and developing solutions:

- The student will use mathematical and analytical methods to diagnose and solve problems related to fluid flow.
- The student develops effective solutions to practical problems in fields such as civil engineering, mechanical engineering, and environmental engineering.
- The student will understand the environmental and industrial applications of fluid :mechanics
- The student will study how the principles of fluid mechanics are applied in .environmental and industrial contexts such as water treatment, fuel combustion, and air flow
- :The student applies practical skills
- The student develops practical skills through laboratory experiments and practical .applications to analyze fluid behavior
- The student will carry out design and analysis projects related to fluid flow using .various tools and techniques

Specific objectives

Understanding the basic properties of fluids:

- **The student will identify physical properties**: understand and apply basic properties of fluids such as density, viscosity, and pressure.
- **The student analyzes the effect of properties**: Analyze how the properties of fluids affect their behavior under different conditions.

Application of the laws of conservation of mass and energy:

- **Law of conservation of mass**: The student uses the continuity equation to analyze the flow of fluids in pipes and channels.
- **Law of conservation of energy**: The student applies Bernoulli's equation to understand the effect of energy on fluid flow.

Behavioral objectives or learning outcomes

Understanding the properties of fluids:

- The student will learn about the basic physical properties of fluids, including density, viscosity, pressure, and temperature.
- The student will understand how these properties affect the behaviour of fluids under different conditions.

Application of the laws of conservation of mass and energy:

- The student will apply the law of continuity (law of conservation of mass) to analyze the flow of fluids in pipes and channels.
- The student will use Bernoulli's equation to explain and analyze the relationship between kinetic energy, pressure, and internal energy in fluid flow.

Fluid flow analysis:

- The student will analyze different patterns of fluid flow such as steady and variable flow, ideal and non-ideal flow.
- The student will understand and analyze the effects of flow on different systems including internal and external flow.

Understanding and processing equations of motion for fluids:

- The student will understand and apply the Navier-Stokes equations to analyze the flow of non-ideal fluids.
- The student applies the equation of state in studying the behavior of fluids under different conditions.

Evaluation of fluid pressure effects:

- The student should calculate It measures fluid pressure and uses it to analyze the behavior of fluids in various systems.
- The student studies the effect of pressure on fluid flow and analyzes the effects of mechanical forces.

Analysis of fluid flow in pipes and channels:

- The student will use equations such as the Darcy- Weisbach equation to analyze pressure loss in pipes.
- The student will understand the effect of friction and changes in cross section on fluid flow.

Understanding fluid dynamics:

- The student will apply the principles of aerodynamics to understand the behavior of fluids around objects, such as lift and drag forces.
- The student will analyze the effects of aerodynamics on the design of vehicles and aircraft.

Application of knowledge in engineering design and analysis:

- The student will use the principles of fluid mechanics in the design and analysis of systems such as pumps, fans, and heat exchangers.
- The student improves the designs of systems and structures based on fluid flow analyses.

Conduct laboratory experiments and analyze data:

- The student will conduct laboratory experiments to study the behavior of fluids and analyze experimental data.

Prerequisites

- **The student must be familiar with arithmetic operations and solving . equations**

Evaluation mechanism	Behavioral objectives or basic learning outcomes	
Daily, monthly and end-of-course theoretical and practical exams	**Understanding the basic properties of fluids**:	T
Daily, monthly and end of course exams	**Identify physical properties**: Understand and apply basic properties of fluids such as density, viscosity, and pressure.	**1**
Daily, monthly and end-of-course theoretical and practical exams	**Properties Effect Analysis**: Analysis of how fluid properties affect their behavior under different conditions.	**2**
Daily, monthly and end-of-course theoretical and practical exams	**Application of the laws of conservation of mass and energy**:	**3**
Daily, monthly and end-of-course theoretical and practical exams	**Law of conservation of mass**: Using the continuity equation to analyze fluid flow in pipes and ducts.	**4**

Teaching Methods (Select a variety of teaching methods to suit student needs and (course content

Reasons for selection	style or method
Theoretical + practical course	**7. Theoretical and practical lectures**
	8. Preparing laboratory experiment reports
	.3
	.4
	.5
	.6

Number of weekly hours				First academic year	**Principles of Fluid Mechanics**	In Arabic	Name of the material
Number of units	the total	practical	theoretical		**Principles of Fluid Mechanics**	In English	
4	4	2	2	Level 1, First Semester (Compulsory (lessons	English	Language of instruction for the subject	

Theoretical vocabulary

Vocabulary details	**The week**
Hydraulics , Dimensions and Units	**1**
Fluids, fluid properties (density, relative density, viscosity, vapor pressure, (surface tension	**3 – 2**
Hydrostatics (Pressure , absolute pressure, Pascal's rule, hydraulic presses, (pressure gauges	**5 – 4**
Forces acting on submerged surfaces (flat and convex)	**7 – 6**
basics , types of flow (steady and unsteady , uniform and irregular), continuity equation	**9 – 8**
Bernoulli's energy equation (without friction and with friction)	**11 – 10**
Frictional losses (primary losses , secondary losses)	**13 – 12**
Types of flow in pipes, flow stratification , turbulent flow , Reynolds number	**15 – 14**

Practical Vocabulary

Vocabulary details	**The week**
View hydraulics lab , how to prepare lab reports	**1**
Solving problems about fluid properties	**2**
Experiment on the properties of fluids	**3**
Solving problems about pressure	**4**
Bourdon scale calibration experiment	**5**

Solving problems about forces acting on submerged surfaces	**6**
.An experiment to measure the forces acting on submerged surfaces	**7**
Solving problems about the communication equation	**8**
Experiment to find the discharge by the weight and volume method	**9**
Solving problems about the energy equation	**10**
Experiment to prove Bernoulli's equation	**11**
Experiment to find the main lost	**12**
Experiment to find secondary losses	**13**
Experiment to find secondary losses (expansion and contraction)	**14**
Experiment to find Reynolds number	**15**

Introduction to Survey						**Course name:**
Environmental and Water Resources Technologies						**Section:**
Mosul Technical Institute						**College:**
the first						**Stage/Level**
the first						**Semester:**
3	practical	2	theoretical			**Number of weekly hours:**
4						**:Number of academic units**
WRTI128						**:Code**
✓	Both of them		practical		theoretical	**Material type**
Yes				**Is there a counterpart to the course in other ?departments**		
Introduction to space						**Name of the corresponding course**
Civil Techniques + Surveying						**Section**
						Course code counterpart
Subject teaching information						
Dr. Adnan Abdul Wahab						**course Name of the : teacher(s)**
assistant professor						**:Academic title**
						Year of obtaining the title
PhD						**:Certificate**
						Year of obtaining the certificate

	Number of years of experience (teaching)

General description of the course

Teaching the student to use advanced devices for surveying purposes and preparing the necessary maps for various engineering projects, where the student learns mathematical surveying methods and the use of theodolites and how to plan and supervise the implementation of construction work.

General objectives

- The student will be able to understand the importance of surveying in planning .buildings and engineering projects
- .The student will learn modern scanning methods

Specific objectives

- The student will learn Functions of tools and equipment used in surveying such as total stations and GPS.
- The student learns to use surveying tools and equipment in the field.
- The student should perform accurate measurements using various devices.
- **Performing and verifying measurements**:
- The student should perform accurate surveying measurements on the ground and verify their accuracy.
- The student uses different scanning techniques such as mechanical scanning and electronic scanning.

Behavioral objectives or learning outcomes

- **Troubleshooting**:
- The student identifies and solves problems related to accuracy and error in measurements and surveying.
- The student applies error correction strategies and modifies data as needed.
- **Conducting a survey and documenting the results**:

- The student should be able to conduct a comprehensive field survey and document the results in an organized and accurate manner.
- The student must submit reports that explain the survey results and analysis results in a clear and understandable manner.
- **Application of laws and standards**:
- The student understands and applies local and international laws and standards related to space.
- The student must ensure compliance with ethical and professional standards during the implementation of surveying projects.
- **Surveying Project Management**:
- The student will be able to plan and organize survey projects effectively.
- The student should be able to manage time and resources to ensure that projects are implemented efficiently and within the specified time frame.

Prerequisites

- .The student must be familiar with dealing with angles and mathematical analysis

Behavioral objectives or basic learning outcomes		
Theoretical and practical exam and weekly reports	The student will learn Functions of tools and equipment used in surveying such as total stations and GPS.	T
Theoretical and practical exam and weekly reports	Proficiency in the use of surveying tools and equipment in the field.	**1**
Theoretical and practical exam and weekly reports	Performing accurate measurements using various devices.	**2**
Theoretical and practical exam and weekly reports	**Performing and verifying measurements**:	**3**

Theoretical and practical exam and weekly reports	Conducting accurate surveying measurements on the ground and verifying their accuracy.	**4**

Teaching Methods (Select a variety of teaching methods to suit student needs and (course content

Reasons for selection	style or method
The course requires theoretical lectures in .addition to practical ones	**9. Theoretical lectures**
	10. Practical application outside the classroom
	.3
	.4
	.5
	.6

Number of weekly hours				First academic year	**Surveying) (1**	In Arabic	Name of the material
Number of units	the total	practical	theoretical		**Surveying (1)**	In English	
5	5	3	2	Level 1, First Semester (Compulsory (lessons		Language of instruction for the subject	

Theoretical vocabulary

Vocabulary details	**The week**
Basic principles of surveying, its divisions, uses, and purposes	1
Measuring distances on horizontal slopes and undulating terrain	2
Settlement, its methods, related definitions, finding elevation methods between points	3
Calculating levels in two ways, types of settlement, errors and mistakes in settlement	6-5-4
Topographic maps and methods of representing landforms	7
.Contour lines, their characteristics, drawing and use	9-8
Learn about the theodolite of all available types and how to check and adjust the device	10
.Measure horizontal angles of a central angle by iteration	11
Measuring vertical angles	12
.Measure the interior horizontal angles of a closed polygon	13
Measuring the horizontal distances of the sides of a closed polygon using a .theodolite , a tape measure and a level	14
Practical exercise on calculating directionsA2 ,b1 Calculate horizontal and .vertical components and correct components and coordinates	15

Practical Vocabulary

Vocabulary details	**The week**

Visit to the surveying laboratory, measuring distances by guessing and steps with a tape	1
Measuring distances on horizontal, sloping and rolling terrain	2
Exercise on setting up columns and how to draw lines parallel to the route from a known point outside it	3
Obstacle training (obstacles), obstacles that hinder the expulsion process but do not hinder the measurement process, obstacles that hinder the measurement process but do not hinder the expulsion process	4
Learn about leveling devices and how to use them, practical exercise on longitudinal leveling	5
Exercise on calculating levels using the rise and fall method	6
Exercise on calculating levels using the device height method	7
Practical exercise on the effect of the Earth's sphericity and light refraction on leveling, exercise on mutual leveling	8
Practical exercise on inverted leveling and double leveling, practical exercise on balancing and correcting leveling lines, practical leveling on fixing levels	9
Closed and open settlement exercise	10
Exercise on longitudinal and transverse sections	13-12-11
Practical and mathematical exercises on contour lines used for the purpose of correcting projects and calculating distances and volume, practical exercise on drawing lines using the mathematical method	15-14

Engineering Mechanics						**Course name:**
Environmental and Water Resources Technologies						**Section:**
Mosul Technical Institute						**College:**
the first						**Stage/Level**
the first						**Semester:**
2	practical	1	theoretical			**Number of weekly hours:**
3						**:Number of academic units**
WRTI138						**:Code**
✓	Both of them		practical		theoretical	**Material type**
Yes				**Is there a counterpart to the course in other ?departments**		
Engineering Mechanics						**Name of the corresponding course**
Civil Techniques + Surveying + Mechanics						**Section**
						Course code counterpart
Subject teaching information						
D. Muhammad Akram Saadi						**course Name of the : teacher(s)**
assistant professor						**:Academic title**
2023						**Year of obtaining the title**
PhD						**:Certificate**
2017						**Year of obtaining the certificate**

18	**Number of years of experience (teaching)**

General description of the course

Introducing the student to the forces affecting bodies and how to calculate their values, analyze structures and buildings, calculate the center of gravity of non-standard composite areas, teach the student how to calculate the curvature in ceilings and thresholds as a result .of the loads imposed on the structure, and determine the stress areas in structures

General objectives

Identify the main objectives of the course: What should students learn and achieve by the end of the course? Use phrases such as “students will learn” or “students will be able to.” (Please see attached guide)

- The student will be able to understand the importance of engineering mechanics in .engineering designs, load distribution and its types
- .The student will learn the analysis methods for the bearing capacity of structures

Specific objectives

- .The student will learn methods of analyzing forces
- .The student will be able to plot the shear stress and torsional moment of beams
- .The student will be able to find the reflexes of fixed and moving joints

Behavioral objectives or learning outcomes

- **Applying the principles of mechanics to design**:
- The student applies the concepts of mechanics in the design and analysis of mechanical elements and structures.
- The student will use the principles of mechanics to evaluate the performance and design of engineering components such as columns, joints, and axles.
- **Use of analysis and design tools**:
- The student will use engineering programs and modern technologies to analyze and design mechanical systems and structures.

- The student applies computer analysis tools such as Finite Element Analysis(FEA) to analyze stresses and deformations.
- .**The student will solve complex problems** related to loads imposed on buildings

Prerequisites

- .The student must be familiar with dealing with angles and mathematical analysis

Evaluation mechanism	Behavioral objectives or basic learning outcomes	
Theoretical exam and weekly reports	Knowledge of basic laws such as Newton's laws of motion, the laws of dynamics, and the laws of statics.	T
Theoretical exam and weekly reports	**Force and balance analysis**:	**1**
Theoretical exam and weekly reports	The ability to analyze equilibrium forces in static systems and dynamic systems.	**2**
Theoretical exam and weekly reports	Solve problems of forces and moments in various structures and systems, including simple and complex structures.	**3**
Theoretical exam and weekly reports	**Stress and deformation analysis**:	**4**

Teaching Methods (Select a variety of teaching methods to suit student needs and (course content

Reasons for selection	style or method
Theoretical course	**11. Theoretical lectures**
	12.
	.3
	.4
	.5
	.6

Number of weekly hours				First academic year	**Engineering mechanics**	In Arabic	Name of the material
Number of units	the total	practical	theoretical		**Engineering Mechanic**	In English	
3	3	2	1	Level 1, First Semester (Compulsory (lessons		Language of instruction for the subject	

Theoretical vocabulary

Vocabulary details	**The week**
Force, its analysis, its resultant, force moment, duality , equilibrium , its conditions, equilibrium of converging and non-converging forces	**1**
Computer application: Exercises in analyzing forces and finding their results (as sums 1, 2, 3) , friction, its types – its laws – the angle of friction – the coefficient of friction	**2**
Al-Qawish , its flat types, Al-Lama and Al-Masnanah , its applications, the center of transmission for regular and irregular geometric shapes , the center of gravity for complex spaces	**3**
Moment of inertia (for geometric shapes - square - triangle - rectangle - (circle Moment of inertia for complex areas	**4**
Computer application exercises on friction, centers of transmission and Combined center of gravity and torque ,moments of inertia	**5**
Material ,Ability – Work, the relationship between power, speed and force resistance - types of stresses	**7 - 6**
, Stress-strain curve and its plot ,Types of emotion and its applications Deformations Elastic deformation, plastic deformation	**8**
Tensile and compressive stress , Hooke's law and its applications	**9**
Computer-based exercises on centers of motion, moment of inertia, stress and strain issues	**10**

Shear stress - its laws - its applications in bolts - and the areas of fastening and rivets, Stress laws for solid and hollow bars	**11**
Integration of central and diffuse powers	**12**
Computer applications on drawing shear and moment and drawing normal and reinforced concrete sections	**13**
Computer applications on drawing compressive stresses and tensile stresses in homogeneous and heterogeneous sections	**14**
Discussion of the practical results of applying the material vocabulary to the calculator	**15**

Basics of soil mechanics	**Course name:**
Environmental and Water Resources Technologies	**Section:**
Mosul Technical Institute	**College:**
the second	**Stage/Level**
the first	**Semester:**
2 practical 1 theoretical	**Number of weekly hours:**
3	**:Number of academic units**
WRTI249	**:Code**
✓ Both of them practical theoretical	**Material type**
Is there a counterpart to the course in other ?departments	
	Name of the corresponding course
	Section
	Course code counterpart
Subject teaching information	
D. Muhammad Akram Saadi	**course Name of the : teacher(s)**
assistant professor	**:Academic title**
2023	**Year of obtaining the title**
PhD	**:Certificate**

2017	**Year of obtaining the certificate**
18	**Number of years of experience (teaching)**

General description of the course

The course generally aims to introduce the student to soil from an engineering perspective and to know some laboratory and field tests to find its engineering properties and to consolidate the student's practical experience in soil stabilization and compaction work and .the machines used in that

General objectives

Learning objectives of a course in **soil mechanics** can include a set of general objectives that aim to prepare students to understand and analyze the behavior of soil and apply the principles of soil mechanics in the design and construction of foundations and construction projects. These objectives can be summarized as follows:

1. **Understanding the basic properties of soil**:
   - **The student will identify and explain** the physical and mechanical properties of soil, including granular properties, cohesion, and texture.
2. **Analysis of soil behavior under loads**:
   - **The student will analyze** the response of soil to different loads and determine how they are distributed and transmitted to foundations and structures.
3. **Application of soil mechanics principles in design**:
   - **The student will apply** the basic principles of soil mechanics in designing foundations and evaluating the stability of structures.
4. **Use of soil testing techniques**:
   - **The student applies** soil testing techniques and methods (such as shear testing, compression testing, and other tests) to analyze its properties and behavior.
5. **Understanding soil interactions with structures**:
   - **The student will evaluate** how soil interacts with various structures, including foundations, retaining walls, and excavation structures.

Specific objectives

The specific objectives of a course in **soil mechanics** are concerned with defining what students are expected to master by the end of the course. These specific objectives can be summarized as follows:

1. **Understanding the basic properties of soil**:
   - **The student will identify and explain** the physical properties of soil, such as volume, density, and texture, and how they affect soil behavior.
2. **Conducting soil tests**:
   - **The student conducts** laboratory and field tests to determine the mechanical properties of soil such as shear strength, compressive strength, and expansion coefficient.
3. **Analysis of soil behavior under loads**:
   - **The student will analyze** the response of soil to different loads, such as live and dead loads, and estimate their effect on the stability of foundations.
4. **Foundation design**:
   - **The student designs** different types of foundations (such as shallow and deep foundations) based on soil properties and acting loads.
5. **Soil stability assessment**:
   - **The student will assess** soil stability and analyze risks related to landslides and foundation subsidence.
6. **Application of soil mechanics principles**:
   - **The student will apply** the principles of soil mechanics to solve foundation and construction design problems, such as determining the bearing capacity of the soil and load distribution.
7. **Estimation of the effect of humidity**:
   - **The student will appreciate** the effect of soil moisture content on its behaviour and properties, and how to deal with changes in moisture.

Behavioral objectives or learning outcomes

- **Soil problem management**:
- **The student will diagnose and treat** soil-related problems such as subsidence, swelling, and landslides.
- **Application of quality and safety standards**:
- **The student will understand** and apply quality and safety standards related to the design and implementation of foundations and soil projects.

- **Use of engineering software**:
- **The student should employ** specialized engineering software in soil and foundation analysis and design, such as modeling and simulation programs.
- **Critical and analytical thinking**:
- **The student develops** critical and analytical thinking skills to analyze soil data and evaluate test results and designs.
- **Effective communication**:
- **The student prepares** technical reports that show the results of tests and soil analysis, and communicates effectively with engineering teams and clients.
- **Keeping up with modern developments**:
- **The student should keep up with** the latest developments in the field of soil mechanics and new techniques to improve the design and construction of foundations.

Prerequisites

- **The student must be familiar with arithmetic operations and solving equations .**

Evaluation mechanism	Behavioral objectives or basic learning outcomes	
Daily, monthly and end of course exams	**Understanding the basic properties of soil**:	T
Daily, monthly and end of course exams	**Identify and explain** the physical properties of soil, such as volume, density, and texture, and how they affect soil behavior.	**1**

Daily, monthly and end of course exams	**Conducting soil tests**:	**2**
Daily, monthly and end of course exams	**Conduct** laboratory and field tests to determine the mechanical properties of soil such as shear strength, compressive strength, and expansion coefficient.	**3**
Daily, monthly and end of course exams	**Analysis of soil behavior under loads**:	**4**

Teaching Methods (Select a variety of teaching methods to suit student needs and (course content

Reasons for selection	style or method
.The course is theoretical and practical	**13. Theoretical and practical lectures**
	14.
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Environmental and Water Resources Technologies

M	A	N	Number of weekly hours	System Decisions	Department and scientific branch Environmental and Water Resources Technologies
3	2	1			
Soil mechanics				Level 2	Vocabulary of the subject of basic soil mechanics
: objective of the subject The course generally aims to introduce the student to soil from an engineering perspective and to know some laboratory and field tests to find its engineering properties and to consolidate the student's practical experience in soil stabilization and .compaction work and the machines used in that					

Theoretical vocabulary	The week
Definition of soil, its origin, composition and classification according to its presence in nature (sedimentary, residual, buried) and representation of . soil geometrically	2 – 1
- : Physical relationships of soil components Volumetric relationships (porosity , void ratio, degree of saturation and air (ratio Weight relations (density) Mass , saturated density, submerged density, .(dry density, relative density	4 – 3
specific gravity of soil Definition of soil specific gravity , its importance and its physical .relationship with soil components	5
- :Volumetric analysis of soil particles Coarse analysis using the sieve method and fine analysis using Capacitor . layer	7 - 6
Linking coarse and fine analysis (solved mathematical examples of soil .(models	8

- :Atterberg borders For soil .(Liquidity limit , plasticity limit , shrinkage limit	9
Soil classification Unified System Method , American Methods SystemASH TTO, (Massachusetts Institute of Technology System , Triple Soil System	11 – 10
Water movement in soil and soil permeability	12
law , factors affecting permeability in soil, methods of measuring permeability coefficient in the laboratory (fixed and variable water column (method Measure the permeability coefficient in situ and createa flownet inside the soil : compaction .Proctor check Standard, Proctor check rate and air ratio lines	14 – 13 15

- :Sources

Field and laboratory tests in soil mechanics and earthworks 1966 / prepared by Makram .Anwar Al-Sheikh

.Soil Engineering / Hamed Al-Saeedi

.Soil Mechanics / Dr. Mamtaz Hababa

"Engineering properties of soils and measurement", Bowles .J.E ; 2nd edition . 1982

Practical Vocabulary

Vocabulary details	The week
.Visit the soil mechanics lab, learn about the equipment and how to write a report	1
. water content test	2
.Check the amount of organic matter in the soil	3
.Find the specific gravity of soil	4
.Mathematical applications of physical relationships For soil	6 - 5
.Soil gradation examination (coarse analysis using sieve method)	7
.Soil gradation examination (fine analysis using the hydrometer method)	8
.Mathematical applications on the link between coarse and fine analysis	9

.Utterbrack limits (Testing the liquid limit, plastic limit and shrinkage limit)	10
Mathematical applications about Aterberg limits and how to use them . Soil . applications	11
. Soil permeability testing using the static water column method	12
. Soil permeability testing using the variable water column method	13
.Proctor check Standard	14
.Proctor check The rate	15

Sprinkler irrigation techniques						**Course name:**
Environmental and Water Resources Technologies						**Section:**
Mosul Technical Institute						**College:**
the second						**Stage/Level**
the first						**Semester:**
2	practical	1	theoretical			**Number of weekly hours:**
3						**:Number of academic units**
WRTI247						**:Code**
✓	Both of them		practical		theoretical	**Material type**
Yes				**Is there a counterpart to the course in other ?departments**		
Engineering drawing						**Name of the corresponding course**
Civil + Mechanical						**Section**
						Course code counterpart
Subject teaching information						
Dr. Abdel Nasser Abdel Razak Ahmed						**course Name of the : teacher(s)**
assistant professor						**:Academic title**
						Year of obtaining the title
PhD						**:Certificate**
						Year of obtaining the certificate

18	**Number of years of experience (teaching)**

General description of the course

Introducing and teaching the student how to work on sprinkler irrigation systems of all types .operate and maintain them, and the factors affecting them ,

General objectives

Learning sprinkler irrigation techniques is one of the basic topics in modern agriculture, and has many general objectives related to improving the efficiency of water use and enhancing crop productivity. Among the general objectives that can be achieved when studying this course:

1. **Understanding the principles of sprinkler irrigation**: The student will become familiar with the basics of sprinkler irrigation techniques, including how different irrigation systems work and the mechanism by which water is distributed.
2. **Irrigation Systems Design**: The student learns how to design sprinkler irrigation systems suitable for different crop types and environmental conditions, including selecting appropriate equipment and determining the sizes of pipes and pumps.
3. **Performance Analysis**: The student will be able to evaluate the efficiency of sprinkler irrigation systems by measuring the water distribution rate and using system effectiveness analysis methods to identify any possible improvements.
4. **Water Management**: The student will understand how to manage water effectively through sprinkler irrigation, including calculating crop water requirements, monitoring water consumption and reducing waste.
5. **Evaluating the impact of irrigation on crops**: The student studies the impact of sprinkler irrigation systems on crop growth and productivity, and how to improve growth conditions using this technology.
6. **Maintenance and repair**: The student learns how to maintain sprinkler irrigation systems periodically to ensure their efficient operation, and how to deal with and repair malfunctions.

7. **Application of modern technology**: The student will learn about the latest developments in sprinkler irrigation technology, such as smart systems that use data to improve water distribution and maximize resource utilization.

8. **Environmental and Sustainability Trends**: The student will study how to use sprinkler irrigation techniques in accordance with the principles of environmental sustainability, and evaluate the impact of these systems on the environment and sustainable agricultural practices.

Specific objectives

Knowing **the types of sprinkler irrigation systems**: The student should understand the different types of sprinkler irrigation systems such as fixed, mobile, and portable sprinkler irrigation, and how to choose the most appropriate one based on the type of crops and soil conditions.

Identifying the components of the irrigation system: The student should identify the basic components of sprinkler irrigation systems, such as pumps, pipes, sprinklers, and filters, and understand the role of each in the irrigation system.

Estimating water needs: The student learns how to calculate the water needs of crops based on factors such as crop type, soil type, and climatic conditions, and how to adjust the system to meet these needs.

Irrigation System Design: The student will acquire the skills necessary to design an effective sprinkler irrigation system, including planning the distribution of pipes and determining the locations of sprinklers to achieve balanced water distribution.

Operating the system effectively: The student learns how to operate sprinkler irrigation systems effectively, including adjusting water pressure and determining optimal irrigation intervals.

Behavioral objectives or learning outcomes

The course learning outcomes in sprinkler irrigation techniques define the skills and knowledge that students are expected to acquire upon completion of the course. The main learning outcomes in this course can be summarized as follows:

1. **Understanding the basic principles of sprinkler irrigation**:

- The student will explain the principles of sprinkler irrigation systems and clarify how water is distributed to crops.

2. **Sprinkler irrigation system design**:
   - The student will be able to design a sprinkler irrigation system that suits the type of crops, soil conditions and climate, including determining the type of sprinklers, pipes and pumps.
3. **Determine water needs**:
   - The student calculates the water requirements of crops based on factors such as crop type, soil conditions and climate, and adjusts the irrigation system to meet these needs efficiently.
4. **System operation and maintenance**:
   - The student will operate sprinkler irrigation systems effectively, including adjusting water pressure and irrigation intervals.
   - The student should perform periodic maintenance and minor repairs to components to ensure the continued efficient operation of the system.
5. **System efficiency evaluation**:
   - The student will use tools and techniques to evaluate system performance, such as measuring water distribution and analyzing the effectiveness of the system in providing water to crops.

Prerequisites

- **The student must be familiar with arithmetic operations and solving equations .**

Evaluation mechanism	Behavioral objectives or basic learning outcomes	
Daily, monthly and end of course practical exams	**Understanding the basics of sprinkler irrigation techniques** : Explain the principles of operation of sprinkler irrigation .systems and how to distribute water evenly to crops	T
Daily, monthly and end of course practical exams	**Design of sprinkler irrigation systems**: Ability to design a sprinkler irrigation system that meets crop .needs based on soil type, crop type, and climatic conditions	**1**
Daily, monthly and end of course practical exams	**Calculating water requirements**: Calculating the amount of water required for each type of crop and determining the appropriate irrigation times to achieve maximum benefit.	**2**
Daily, monthly and end of course practical exams	**System performance evaluation:** • Use tools and techniques to measure the efficiency of the water distribution system, and analyze performance to achieve the necessary improvements**.**	**3**
		4

Teaching Methods (Select a variety of teaching methods to suit student needs and (course content

Reasons for selection	style or method
.The course is practical and theoretical	**15. Theoretical and practical lectures**
	16.
	.3
	.4
	.5
	.6

M	A	N	Number of weekly hours	Course system	Department and scientific branch Environmental and Water Resources Technologies
3	2	1			
				Level 2	Sprinkler irrigation techniques vocabulary

: objective of the subject

Introducing and teaching the student how to work on sprinkler and drip irrigation .systems of all types , their operation and maintenance, and the factors affecting them

Theoretical vocabulary	The week
irrigation , benefits and uses of sprinkler irrigation, disadvantages and difficulties	1
Components of sprinkler irrigation system (pumping unit , pipe network, (sprinklers	2
Sprinkler irrigation system accessories (valves , gauges)	3
Types of sprinkler irrigation systems (fixed and mobile)	4
Water distribution around the sprinkler Water distribution patterns	5
sprinkler irrigation system , sprinkler spacing and arrangement, irrigation rate	6
Hydraulic sprayer , spray consistency	7
Spray pipes , lengths and numbers, number of moves	8
Calculation of lost charge due to friction in pipes , pressure in pipes	9
Pipe diameter calculation	10
Main and sub piping system , design requirements	11
Pipe design methods (flow velocity method, friction loss method and (economic analysis method	12

Regulatory procedures for the operation and maintenance of feeding channels and the facilities built on them for mobile sprinkler irrigation systems	**13**
Installation and installation of fixed and semi-fixed sprinkler irrigation system , operation and maintenance of fixed and semi-fixed sprinkler irrigation system	**14**
Installation, operation and maintenance of the center pivot irrigation system (pumping system , sprinkler)	**15**

Irrigation and drainage networks						**Course name:**
Environmental and Water Resources Technologies						**Section:**
Mosul Technical Institute						**College:**
the second						**Stage/Level**
the first						**Semester:**
3	practical	1	theoretical			**Number of weekly hours:**
4						**:Number of academic units**
WRTI243						**:Code**
✓	Both of them		practical		theoretical	**Material type**
both				**Is there a counterpart to the course in other ?departments**		
						Name of the corresponding course
						Section
						Course code counterpart
Subject teaching information						
Dr. Adnan Abdul Wahab						**course Name of the : teacher(s)**
assistant professor						**:Academic title**
						Year of obtaining the title
PhD						**:Certificate**
						Year of obtaining the certificate

18	**Number of years of experience (teaching)**

General description of the course

Teaching the student and providing him with the necessary technical skills about the facilities Irrigation , its functions, components and methods of implementation, in addition to teaching the student to calculate the forces affecting dams and the safety factor against .the failure of irrigation projects

General objectives

is a vital topic in the field of agriculture and water resources management. The general learning objectives of this course may include the following:

Understanding the basic principles of irrigation and drainage networks:

- The student will become familiar with the basic concepts and systems used in irrigation and drainage.
- The student understands the importance of irrigation systems in improving the productivity of agricultural lands and how to use drainage to maintain soil health.

Design and planning of irrigation systems:

- The student learns how to design irrigation systems suitable for different areas according to crop needs and soil conditions.
- The student applies the principles of engineering in planning and designing water networks.

Evaluation and analysis of irrigation and drainage systems:

- The student learns how to evaluate the effectiveness of irrigation and drainage systems in water use and distribution.
- The student analyzes the performance of systems and identifies potential problems and ways to improve them.

Effective water management:

- The student will understand water management strategies to reduce loss and increase the efficiency of its use.

Specific objectives

The specific learning objectives of the course on irrigation and drainage networks focus on developing the skills and knowledge necessary to deal with irrigation and drainage systems :in a detailed and practical manner. The specific objectives included in this course include

Design and implementation of an effective irrigation system:

- The student learns how to conduct a field survey and evaluate agricultural characteristics to design a suitable irrigation system.
- The student will apply engineering principles in designing an irrigation network, including flow and pressure calculations, and determining the locations of channels and pumps.

Design and implementation of an effective drainage system:

- The student will understand how to design a drainage system to deal with the problems of high groundwater levels and avoid salt accumulation.
- The student learns how to select and plan appropriate drainage systems such as submerged drainage and surface drainage.

Performance analysis of irrigation and drainage systems:

- The student learns how to evaluate the performance of different systems by measuring performance indicators such as water distribution efficiency and soil quality.
- The student applies analytical techniques to identify problems and suggest improvements.

Behavioral objectives or learning outcomes

The learning outcome of a course in “Irrigation and Drainage Networks” reflects what students are expected to learn and achieve by the end of the course. The expected learning outcomes can be summarized as follows:

8. **Understanding the basics and principles of irrigation and drainage systems**:
   - The student will describe the basic principles of irrigation and drainage systems and how they work.
   - The student will explain key terms such as flow rate, pressure, and water distribution in networks.
9. **Design and planning of irrigation systems**:
   - The student will be able to design an irrigation system that is compatible with the characteristics of the soil, crops and site conditions.

- The student will perform flow and pressure calculations and determine appropriate equipment such as pumps and pipes.

10. **Design and planning of drainage systems**:

- The student will be able to design an effective drainage system to deal with the problems of high groundwater and salt accumulation.
- The student should select the appropriate type of puncture system (such as submerged puncture or surface puncture) based on the site evaluation.

11. **Systems performance evaluation**:

- The student will analyze the effectiveness of systems by measuring performance indicators such as water distribution and drainage efficiency.
- The student uses tools and techniques to evaluate the quality of the system and identify areas for improvement.

12. **Effective water management**:

- The student applies water management strategies to improve water use efficiency and reduce waste.
- The student will use different methods to estimate water needs and monitor its consumption.

Prerequisites

- **The student must be familiar with arithmetic operations and solving equations .**

Evaluation mechanism	Behavioral objectives or basic learning outcomes	
Daily, monthly and end of course exams	**Design and implementation of an effective drainage system**:	T
Daily, monthly and end of course exams	Understand how to design a drainage system to deal with high groundwater problems and avoid salt accumulation.	**1**

Daily, monthly and end of course exams	Learn how to select and plan appropriate puncture systems such as submerged and surface puncture.	**2**
Daily, monthly and end of course exams	**Water efficiency management**:	**3**
Daily, monthly and end of course exams	Studying ways to reduce water waste and increase the efficiency of water resource use in agriculture.	**4**

Teaching Methods (Select a variety of teaching methods to suit student needs and (course content

Reasons for selection	style or method
.The course is theoretical and practical	**17. Theoretical and practical lectures**
	18.
	.3
	.4
	.5
	.6

M	T	A	N	number	Course system	Department and scientific branch
4	-	3	1	Watches weekly		Environmental and Water Resources Technologies
Irrigation Constructions					Phase 2	Subject vocabulary Irrigation and drainage networks
-: goal The material Year Teaching the student and providing him with the necessary technical skills about the facilities Novels and drawing using the AutoCAD system their functions, components, methods of implementation , .on the computer for at least six weeks						

Theoretical vocabulary

Vocabulary details	The week
.Giving an initial idea about hydraulic structures , their types and uses	the first
Terms used in drawing structures Hydraulics, its interpretation	the second
Irrigation and drainage network plans and the facilities built on them	the third
Longitudinal and transverse sections of various channels and drains	Fourth
Prevailing walls, their functions, forces affecting them, construction sites, uses and types	Fifth
Brick retaining walls	Sixth
Concrete retaining walls	Seventh
The regulator, its types, components of the regulator, inflection through the regulator	The eighth
Dimensions of the regulator (length of the bow, length of the stern, (thickness of the floor	Ninth
Intermediate supports in regulators, their dimensions and specifications	tenth
Manholes, their components, types, and layout locations	eleventh
Tubular manholes , box manholes	twelfth
Flow in manholes, siphons and calculation of their discharges	thirteenth
Bridges, their components, their types	fourteenth
pedestrian bridge , car bridge	fifteenth

Practical part : - Drawing plans, maps and details for each facility

.using AutoCAD on the computer for at least six weeks Submit three drawings

- :Sources

1- Borders / Arbil Mari / Awidat Publications / Beirut 1971

2- Hydraulic Constructions - Dr. Mohammed Al-Janabi Al-Rateb Publications for University Research

3- "Design Text Book in Civil Engineering", Serge Lilivssky . Vol. I.. III. Chapman and Mall 1965

4- “Water Resources Engineering”, Linsley and Franklin, McGraw Hill, 1971.

5- "Engineering of Large Dams", By Henry M. Tomas.

6- "Hand Book of Applied Hydraulics ", Calvin Victor, McGraw Hill, 1969.

7- "Hand Book of Dam Engineering", Alfred K. Clyde Pub. Urn.

- : resources

Irrigation Drawing, Abdul Rasool Abdul Redha, 1993 -1

Introduction to Drainage						**Course name:**
Environmental and Water Resources Technologies						**Section:**
Mosul Technical Institute						**College:**
the second						**Stage/Level**
the first						**Semester:**
2	practical	1	theoretical			**Number of weekly hours:**
3						**:Number of academic units**
WRTI245						**:Code**
✓	Both of them		practical		theoretical	**Material type**
both				**Is there a counterpart to the course in other ?departments**		
						Name of the corresponding course
						Section
						Course code counterpart
Subject teaching information						
Dr. Adnan Abdul Wahab						**course Name of the : teacher(s)**
assistant professor						**:Academic title**
						Year of obtaining the title
PhD						**:Certificate**
						Year of obtaining the certificate

	Number of years of experience (teaching)

General description of the course

Preparing and preparing the student to be interested in drainage and land reclamation and providing him with the information to develop his necessary experience in field investigation work . Implementation of drainage and land reclamation projects and how to carry out maintenance in drainage projects

General objectives

Understanding the basics of puncture:

- The student will be familiar with the concept of drainage and its basic objectives in improving soil quality and water management, including the difference between surface drainage and vertical drainage.

Definition of drainage systems:

- The student will study the different types of puncture systems, such as natural and artificial puncture, and learn about the main components of each system and how they work .

Determine the importance of puncture:

- The student will explain the importance of the drainage system in improving soil quality, enhancing crop growth, and preventing problems such as salinization and poor soil aeration.

Specific objectives

Definition of the concept of puncture:

- The student should explain the concept of drainage as a process to remove excess water from the soil and improve soil quality, and clarify the importance of this process in agriculture.

Distinguishing types of drainage systems:

- The student will learn about the different types of drainage systems, such as surface drainage and vertical drainage, and how to choose the most appropriate system based on the soil type and crop needs.

Soil properties analysis:

- The student will learn how to evaluate soil properties relevant to drainage, such as soil permeability, groundwater level, and degree of salinity, and determine the need to apply a drainage system.

Design of the drainage system:

- The student will acquire the skills to design an effective drainage system that suits the characteristics of the soil and crops, including choosing the appropriate materials and equipment, and determining the depths and distances between pipes.

Application of puncture installation techniques:

- The student will learn how to properly install a drainage system, including placing pipes, creating drain points, and ensuring the system operates efficiently.

Behavioral objectives or learning outcomes

- **Understanding the basics of puncture**:
- **The student should explain** the concept of drainage, its objectives, and the importance of its application in improving soil quality and water management in agricultural systems.
- **Distinguishing types of drainage systems**:
- **The student will identify** the different types of puncture systems such as surface puncture and vertical puncture, and understand how each type works and its appropriate applications.
- **Soil properties analysis**:
- **The student will evaluate** soil properties that affect the drainage system, such as soil permeability, groundwater level, and degree of salinity, to determine the need for drainage and design an appropriate system.
- **Design of drainage systems**:
- **The student designs** a drainage system that suits the characteristics of the soil and crops, including the selection of pipes, determining depths, spacing between pipes, and creating drainage points.
- **Application of puncture installation techniques**:

- **The student shall install** the drainage system correctly according to the design, ensuring that all components operate efficiently to drain excess water.
-

Prerequisites

- **The student must be familiar with arithmetic operations and solving equations .**

Evaluation mechanism	Behavioral objectives or basic learning outcomes	
Daily, monthly and end of course exams	**Distinguishing types of drainage systems**:	T
Daily, monthly and end of course exams	Learn about the different types of drainage systems, such as surface drainage and vertical drainage, and how to choose the most appropriate system based on soil type and crop needs.	**1**
Daily, monthly and end of course exams	**Soil properties analysis**:	**2**
Daily, monthly and end of course exams	Learn how to evaluate soil properties relevant to drainage, such as soil permeability, groundwater level, and degree of salinity, and determine the need for a drainage system.	**3**
Daily, monthly and end of course exams	**Design of the drainage system**:	**4**

Teaching Methods (Select a variety of teaching methods to suit student needs and (course content

Reasons for selection	style or method
.The course is theoretical and practical	**19. Theoretical and practical lectures**
	20.
	.3
	.4
	.5
	.6

M	A	N	number Watches weekly	Course system	Department and scientific branch Environmental and Water Resources Technologies
3	2	1			
Drainage				Phase 2	Subject vocabulary Introduction to Drainage

: objective of the subject

Preparing and preparing the student to be interested in drainage and land reclamation and providing him with the information to develop his necessary experience in field investigation . work

- : objective of the article

For the purpose of implementing drainage and land reclamation projects and how to carry out .maintenance in drainage projects

Vocabulary details	The week
Drainage, introduction, excess water, its sources and its effect on plants , . methods of treatment, controlling sources of excess water	1
Field investigations of drainage, how to obtain hydrological information, piezometer monitoring wells and how to install them in the field and their importance in drainage works	2
Collection and analysis of monitoring well readings and Piezometers , groundwater changes its direction and calculates its quantities, uses of .lasers in determining water movement Subterranean	3
Permeability, permeability coefficient , measured in the laboratory by . constant and variable pressure method	4
Field method for measuring permeability (the method Cylindrical hole, piezometer method , reverse cylindrical hole method, double perforated (hole	5
theory , Forchheim R , Types of trocars , subsurface trocars, cutting trocars, low trocars	6
trocars , covered trocars , field trocars , vertical trocars	7
Surface drains and their calculations	8
Calculation of subsurface drain spacing for homogeneous soils, calculation of drain spacing for natural soils	9
Types of saline soils, their sources, and methods of measuring them	10
Types of salts in the soil and their distribution, the effect of salts on plants	11
Land Reclamation , Introduction to Land Washing Process	12
Washing requirements , water and salt balance in the root zone	13
Washing efficiency factor, water and salt balance in different saline soils	14
Washing operations in saline and sodic soils	15

Introduction to Hydrology						**Course name:**
Environmental and Water Resources Technologies						**Section:**
Mosul Technical Institute						**College:**
the second						**Stage/Level**
the first						**Semester:**
2	practical	1	theoretical			**Number of weekly hours:**
3						**:Number of academic units**
WRTI241						**:Code**
✓	Both of them		practical		theoretical	**Material type**
both				**Is there a counterpart to the course in other ?departments**		
						Name of the corresponding course
						Section
						Course code counterpart
Subject teaching information						
Abdullah Ahmed Sheikho						**course Name of the : teacher(s)**
assistant professor						**:Academic title**
						Year of obtaining the title
Master's						**:Certificate**
						Year of obtaining the certificate

35	**Number of years of experience (teaching)**

Theoretical vocabulary

Vocabulary details	The week
Hydrological Definitions - Water Cycle in Nature and Hydrological Equation	1
Weather , weather stations and their types, measuring temperature and solar radiation, humidity	2
Wind - Air Pressure	3
Using computers to monitor and measure atomic information - Use of satellites	4
Rainfall, Rainfall shapes, Rainfall types, Rain gauges, Intensity, Sustainability and Frequency	5
Calculating rainfall rates over areas - Thiessen method	6
Isosphere Method – Guessing the Missing Information	7
Snow cover survey - Snow gauges - Snow melting	8
Evaporation, evaporation from water bodies - evaporation from the earth's surface	9
Filtration – Filtration Measurement – Filtration Rate Calculation	10
Groundwater , formations, aquifers Steady flow towards wells in free and confined formations	11
Surface runoff , methods of estimating surface runoff, rational equation	12
feeding basins , their identification, types, river systems	13
Discharge-Level Relationship Curve (Calibration Curve) Determine, Modify and Extend	14
levels , measurement methods and types	15

General description of the course

Providing the student with skills and knowledge in the basics of hydrology, methods of measuring water, the discharge of streams and rivers, studying floods, tracking waves, and the procedures required to protect against them, and providing the student with the skills to measure and calculate the details of the main aspects of the movement and measurement of .water in the natural water cycle

General objectives

The course "Introduction to Hydrology" aims to provide the basics of understanding the water cycle and its relationship to environmental and aquatic systems. This course includes basic topics related to hydrological analysis and its practical applications. The general learning objectives of this course can be summarized as follows:

1. **Understanding the principles of hydrology**:
   - The student will learn the basics of hydrology, including the water cycle and its various stages (evaporation, condensation, precipitation, surface runoff, and infiltration) .
2. **Study of the water cycle**:
   - The student will understand how water moves in nature by studying the exchange process between the atmosphere, soil and water bodies.
3. **Analysis of impact factors**:
   - The student will learn about the factors that affect the water cycle, such as climate, soil, vegetation, and land use, and how they affect water resources.
4. **Hydrological data measurement and analysis**:
   - The student will acquire skills in collecting and measuring hydrological data such as precipitation rates, surface runoff, and evaporation, and analyzing this data to evaluate hydrological patterns.

Specific objectives

Explaining the concept of hydrology:

- The student should explain the definition and scope of hydrology, the importance of studying the water cycle and how it affects the environment and water systems.

Understanding the water cycle:

- The student will describe the different stages of the water cycle (evaporation, condensation, precipitation, surface runoff, infiltration) and how water moves between these stages.

Analysis of influencing factors:

- The student will identify the factors affecting the water cycle, such as climate, soil type, vegetation cover, and land use, and how each of these affects the distribution and quantity of water.

Measurement and estimation of precipitation and runoff:

- The student learns how to measure rainfall amounts using rain gauges and analyze runoff data using different methods and tools.

Study of evaporation and transpiration:

- The student will understand the processes related to evaporation and transpiration (transpiration from plants) and how to measure them and estimate their impact on the water cycle.

Hydrological data analysis:

- The student will acquire skills in collecting, analyzing and interpreting hydrological data to evaluate water patterns and understand the impact of environmental changes.

Behavioral objectives or learning outcomes

Hydrology applications:

- The student explores the practical applications of hydrology in water management, irrigation system design, flood control, and urban planning.

Water resources management:

- The student will learn about water resources management strategies and the techniques used to conserve and manage water sustainably.

Environmental impact assessment:

- The student studies the effects of human activities and climate change on the water cycle and water resources, and how to evaluate and manage these effects.

Understanding climate and environmental changes:

- The student will analyze the impact of climate change on the hydrological cycle, including the impact of changes in rainfall and temperature on water resources.

Moving towards sustainability:

- The student will learn about the principles of sustainability in water management and apply methods that contribute to preserving water resources for future generations.

Prerequisites

- **The student must be familiar with arithmetic operations and solving equations .**

	Behavioral objectives or basic learning outcomes	
	Climate change impact assessment:	T
	Study the impact of climate change on the water cycle, including changes in precipitation rates and temperatures and how they affect water resources.	**1**

	Understanding Water Resources Management:	**2**
	Learn about water resource management strategies and methods, including sustainable water management techniques and flood and drought response measures.	**3**
	Develop research and analysis skills: • Developing research and analysis capabilities in the field of hydrology through case studies and applied projects related to water resources**.**	**4**

Teaching Methods (Select a variety of teaching methods to suit student needs and (course content

Reasons for selection	style or method
.The course is practical and theoretical	**21. Theoretical and practical lectures**
	22.
	.3
	.4
	.5
	.6

Number of weekly hours				First academic year	Microorganisms in water)1(	In Arabic	Name of the material
Number of units	the total	practical	theoretical		Microbiology of water (1)	In English	
2	3	2	1	Level 1, First Semester (Compulsory (lessons		Language of instruction for the subject	

Theoretical vocabulary

Vocabulary details	The week

: Introduction to Microbiology **Characteristics and divisions of microorganisms in Importance - Definition - The relationship between microorganisms and other forms of life - general - and the spread of microorganisms in nature**	**1**
: Microbial nomenclature and classification system **The general way in which microorganisms are named using the binomial common organisms of nomenclature system and members of bacteria - bacteria Classification of microorganisms in general and according to classification classes (species / genus etc.)**	**2**
their spread in – Bacteria, their definition, their physical characteristics the growth and reproduction of – nature, the structure of the bacterial cell bacteria – the growth rate – the bacterial growth curve 0	**4-3**
Factors affecting growth / Germination of bacteria in laboratory conditions / Different requirements for germination / Pure cultures, their importance and methods of isolation / Classification of bacteria	**6-5**
Control of microorganisms	**7**
Control of microorganisms by physical methods	**8**
Control of microorganisms by chemical methods	**9**
:Mold **Its distribution in nature / importance - its external characteristics - reproduction - some important molds**	**10**
:Yeasts **Definition - its spread in nature - its external characteristics - cellular structure - reproduction - some types of the mission**	**12-11**
: Algae and lichens **Definition / Distribution in nature / Characteristics of reproduction / Characteristics of algae / Economic importance of algae**	**14-13**
Basics: Characteristics / Division / Cellular Structure – Reproduction – Most Important Pathogenic Species in Water	**15**

Practical Vocabulary

Vocabulary details	**The week**
Instructions to follow and learn about laboratory equipment	1
Explanation of sterilization and the operation of the autoclave	3 - 2
Preparing the culture media	4
Bacterial culture methods	6 – 5
Study of the morphology of bacteria (hanging drop)	7
Simple dyeing	8
compound dye	9
Study of the morphology of mold	10
Study of the morphology of yeasts	11
Study of the morphology of algae	12
Study of the morphology of protozoa	14 - 13
Biochemical examination	15

Microorganisms in water)1(						**Course name:**
Environmental and Water Resources Technologies						**Section:**
Mosul Technical Institute						**College:**
the first						**Stage/Level**
the first						**Semester:**
2	practical	2	theoretical			**Number of weekly hours:**
4						**:Number of academic units**
WRTO124						**:Code**
✓	Both of them		practical		theoretical	**Material type**
				Is there a counterpart to the course in other ?departments		
						Name of the corresponding course
						Section
						Course code counterpart
Subject teaching information						
Dr. Maha Mohamed Taha Hassan						**course Name of the : teacher(s)**
Teacher						**:Academic title**
						Year of obtaining the title
PhD						**:Certificate**
						Year of obtaining the certificate

	Number of years of experience (teaching)

General description of the course Microbiology in Water 1

Microbiology of Water 1 is an introduction to the study of microbes found in aquatic environments, such as bacteria, viruses, fungi, algae, and protozoa. The course focuses on the role of microorganisms in aquatic systems, and their impact on water quality, public health, and environmental and industrial applications. It also covers techniques for detecting microorganisms in water, methods of analysis, and the effects of environmental factors on them.

General objectives of the course Microbiology in Water 1

Water Microbiology 1 aims to provide students with a comprehensive understanding of the role of microorganisms in aquatic environments and their impact on public health and water quality. The course helps to develop analytical and practical skills to evaluate water and understand methods of water treatment and control of microbial pollution.

The main objectives of the course:

1. **Understanding the basics of water microbiology:**
   - Identify the types of microorganisms that live in fresh, salt, and polluted water .
   - Study of the classification of bacteria, viruses, microscopic algae, fungi and aquatic parasites.
2. **Analysis of the impact of microorganisms on water quality and public health:**
   - Understanding the relationship between microorganisms and health problems such as waterborne diseases.
   - Study the role of microorganisms in water pollution and the spread of infectious diseases.
3. **Developing laboratory skills in detecting microorganisms in water:**
   - Learn methods of isolation and cultivation of microorganisms in the laboratory .
   - Use of microscopy and biochemical tests to identify aquatic microbes.
   - .Analysis of water quality indicators such as coliform bacteria and Ecoli.
4. **Understanding the mechanisms of water treatment and purification using microorganisms:**
   - Study the role of bacteria and fungi in biodegradation and wastewater treatment .

- Learn about sterilization techniques and removing biological pollutants from water.

5. **Developing environmental awareness and responsibility towards water management:**
   - Identify strategies to reduce microbial water pollution.
   - Learn about international water quality laws and standards(WHO ,EPA).
   - Promote critical thinking to solve water pollution problems using biotechnology.

Specific objectives of the course Microbiology in Water 1

The course aims to provide students with specialized knowledge and advanced practical skills in the field of aquatic microbiology, with emphasis on the analysis of biological contamination of water and its impact on health and the environment.

Specific objectives of the course:

1. Understanding and classifying the types of microorganisms in water

☑ Identify different types of microorganisms in fresh, salt, and polluted water.

☑ Classification of bacteria, viruses, fungi, microscopic algae, and aquatic parasites and study of their biological properties.

☑ Understand the difference between beneficial and harmful microorganisms in the aquatic environment.

2. .Study the impact of microorganisms on water quality and public health

☑ Analysis of the relationship between microbes and water pollution.

☑ Understand the role of microorganisms in waterborne diseases(such as cholera, typhoid, and viral hepatitis).

☑ Study of the effect of algal microbes on algal blooms and water toxicity.

3. .Acquire laboratory skills in the study of aquatic microbes

☑ Learn methods of isolation and purification of microorganisms from different water samples.

☑ Conducting standard tests to detect coliform bacteria andE. coli as indicators of water quality.

☑ Use of light microscopy and electron microscopy in the diagnosis of aquatic microorganisms.

☑ Application of biochemical and immunological tests to detect pathogenic microorganisms in water.

4. .Identify water treatment and purification technologies

☑ Study the role of microorganisms in biological wastewater treatment.

☑ Analysis of sterilization methods and removal of biological contaminants (such as (chlorine, ultraviolet rays, and ozone.

☑ Understanding advanced water purification techniques, such as microbiological filtration and the use of biofilms.

5. .Assessing sources of biological water pollution and developing protection strategies

☑ Identify the different sources of microbial pollution(industrial waste, sewage, agricultural activities).

☑ Analysis of the impact of human activity and climate change on the spread of microorganisms in water.

Learning outcomes for the course Microbiology in Water 1

After successfully completing this course, the student is expected to achieve the following outcomes:

1. Knowledge and understanding

☑ Understand the basic concepts of aquatic microbiology, including the classification of microorganisms in fresh, salt and polluted water.

☑ Understand the impact of microorganisms on water quality, public health, and the environment.

☑ Understanding the life cycle of aquatic microbes, and how they spread and reproduce.

☑ Familiarity with types of microbial contamination, waterborne diseases, and the impact of environmental pollutants on the aquatic ecosystem.

2. Intellectual and analytical skills

☑ Analysis of the causes of biological water pollution, and environmental factors affecting the growth of microorganisms.

☑ Interpretation of the results of biochemical and microscopic tests of microorganisms in water.

☑ Ability to assess water quality using biological indicators.

☑ Applying the scientific method to solve environmental problems related to microorganisms in water.

3. Practical and applied skills

☑ Gain skills in collecting water samples and examining them in the laboratory using modern techniques.

☑ Ability to isolate and culture microorganisms from water samples in suitable laboratory environments.

☑ Use of light and electron microscopy to study aquatic microorganisms.

☑ .Conducting tests to identify colon bacteria and Ecoli as evidence of biological contamination.

☑ Learn about water treatment and purification techniques and remove biological pollutants such as chlorine, ozone, and microfiltration.

4. Communication and teamwork skills

☑ Providing scientific reports on water quality based on laboratory analyses.

☑ Ability to discuss environmental solutions to problems related to microbial contamination of water.

☑ Working within research teams to conduct field and laboratory experiments.

5. Self-learning and professional development skills

☑ Ability to search scientific references and modern sources related to aquatic microorganisms.

☑ Develop critical analysis and systematic thinking skills in studying the impact of microorganisms on water.

☑ Qualification to pursue advanced studies in the fields of microbiology, environmental health, and water treatment.

Number of weekly hours				First academic year	**Microorganisms in water (2)**	In Arabic	Name of the material
Number of units	the total	practical	theoretical		**Microbiology of Water (2)**	In English	
2	3	2	1	Level 1 Semester the second (Compulsory (lessons		Language of instruction for the subject	

Theoretical vocabulary

Vocabulary details	**The week**

:Viruses **Characteristics - Structure - Classification methods - Replication Definition - in viruses** **Some important viruses in water**	**2 - 1**
Definition The most important diseases caused by microorganisms in water - The most important pathogens - Definition Diseases caused by - microorganisms and their methods of transmission	**3**
Identify important microbial diseases that may be transmitted through water diseases caused by other organisms -	**4**
:The most important diseases caused by microorganisms in water **Definition of diseases caused by The most important pathogens - Definition - microorganisms and their methods of transmission - Definition of diseases Definition of caused by microorganisms and their methods of transmission - important microbial diseases that may be transmitted through water - Diseases caused by other living organisms**	5
Microorganisms used as evidence of water pollution **The most important laboratory tests used to determine the health suitability of water**	**8 - 7 - 6**
:Microorganisms in aquatic environments **Introducing the student to the importance of the environment in general and aquatic environments in particular. 0 Sources of its relationship with The importance of microorganisms in different types of water - microorganisms in aquatic environments**	10 - 9
Microbiology and drinking water: Filtration methods - Effect of different treatments on microbiology - Microbiological standards for drinking water	**12 - 11**
Applied tests on water pollution	**13**
Bacteriological tests Routine for raw water, water treatment plants , network water and wastewater	**14**
Tests on bacteria in the colon bacteria group	**15**

Practical Vocabulary

Vocabulary details	**The week**
) Most probable numberMPN)	**2 - 1**
Standard total bacterial count(SPC) of drinking water	**5 -4 -3**
Standard total count of sewage bacteria	**7 – 6**
Detection of coliform bacteria in drinking water	**9 – 8**
Detection of coliform bacteria in sewage water	**11 – 10**
Detection of fecal coliform bacteria in drinking water	**13 – 12**
Detection of fecal coliform bacteria in drinking water	**15 - 14**

-

Construction materials	**Course name:**
Environmental and Water Resources Technologies	**Section:**
Mosul Technical Institute	**College:**
the second	**Stage/Level**
the first	**Semester:**
2 practical 1 theoretical	**Number of weekly hours:**
3	**:Number of academic units**
WRTI251	**:Code**
✓ Both of them practical theoretical	**Material type**
	Is there a counterpart to the course in other ?departments
	Name of the corresponding course
	Section
	Course code counterpart
Subject teaching information	
Abdullah Ahmed Sheikho	**course Name of the : teacher(s)**
assistant professor	**:Academic title**
	Year of obtaining the title
Master's	**:Certificate**
	Year of obtaining the certificate

	Number of years of experience (teaching)

General description of the course

The course generally aims to introduce and teach the student about the different construction materials, the concrete used, its types, how to cure it, and to review the special specifications .and conditions of general contracting, contracts and their types

General objectives

Understanding the basic principles: The student should understand the basic principles of construction science, such as forces, stresses, materials, and how they affect structures.

Application of laws and equations: The student uses mathematical laws and equations to design and analyze structures to ensure safety and durability.

Structure Design: The student acquires skills in designing various structures such as buildings, bridges and roads, taking into account safety, economic and functional considerations.

Structural Analysis: The student will be able to analyze structures to determine their response to different forces, such as constant and variable loads.

Choosing the right materials: The student should understand the properties of different materials (such as concrete, steel, wood) and how to choose them based on the project requirements.

Application of quality and safety standards: The student should become familiar with the quality and safety standards related to construction and ensure their application in projects.

Specific objectives

Understanding the properties of basic materials: The student studies the physical and mechanical properties of materials used in construction, such as concrete, steel, and wood.

Behavioral objectives or learning outcomes

Learning outcomes for a course in construction materials specify what students are expected to master by the end of the course. The expected learning outcomes for construction materials courses can be summarized as follows:

1. **Understanding the theoretical foundations**:
   - **The student will identify and explain** the basic principles of structural materials science, such as forces, stresses, and load distribution.
   - **The student will learn** about the properties of different materials (concrete, steel, wood) and how they affect the design of structures.

Prerequisites

- **The student must be familiar with arithmetic operations and solving equations .**

Evaluation mechanism	Behavioral objectives or basic learning outcomes	
Daily, monthly and end of course practical exams	**Understanding the properties of basic materials**: Study the physical and mechanical properties of materials used in construction, such as concrete, steel, and wood. □	T
		1

		2
		3
		4

Teaching Methods (Select a variety of teaching methods to suit student needs and (course content

Reasons for selection	style or method
.The course is practical and theoretical	**23. Theoretical and practical lectures**
	24.
	.3
	.4
	.5
	.6

M	A	N	number Watches weekly	System Decisions weeks 15	Department and scientific branch Environmental and Water Resources Technologies - Irrigation and Drainage Technologies
3	2	1			
Construction Materials				Phase 2	Subject vocabulary Construction materials
- : the goal from Material The course generally aims to introduce and teach the student about the different construction materials and concrete used, their types and how to cure them, as well as how to estimate the quantities used in irrigation and drainage projects, especially with regard to cladding , and to calculate the quantities required for that, and to review the special specifications and conditions of general contracting and contracts and their types, and to calculate the . estimated period for engineering works					

Theoretical part

Vocabulary details	The week
construction materials , a historical overview of them, their importance . and areas of benefit from them	the first
. Construction works	the second
Physical properties Chemical and standard specifications for building . materials	the third
Stone, its uses in construction in general and in irrigation projects in particular, its properties Physical , structural , types and characteristics . of stone used in cladding works	Fourth
. Clay bricks , their properties, uses, and methods of manufacture	Fifth
Sand bricks and concrete blocks, their properties, uses, methods of . manufacture and construction	Sixth
. Sand, its properties, sources, types and engineering specifications	Seventh
. Gravel, its properties, sources, types and engineering specifications	The eighth
. Salts, their types, problems, and how to treat them	Ninth and tenth
. Cement , its types, composition, properties, uses and standard tests	eleventh and twelfth
Concrete, methods of mixing it, factors affecting it, methods of transporting it and implementing it on sites, methods of maturing it, . special tests for it and additives for it	thirteenth
Concrete, methods of mixing it, factors affecting it, methods of transporting it and implementing it on sites, methods of maturing it, . special tests for it and additives for it	fourteenth
Iron used in construction, especially reinforcing steel, its properties, . uses, tests and how to implement it	fifteenth

Quantity survey						**Course name:**
Environmental and Water Resources Technologies						**Section:**
Mosul Technical Institute						**College:**
the second						**Stage/Level**
the second						**Semester:**
2	practical	1	theoretical			**Number of weekly hours:**
3						**:Number of academic units**
WRTI251						**:Code**
✓	Both of them		practical		theoretical	**Material type**
				Is there a counterpart to the course in other ?departments		
						Name of the corresponding course
						Section
						Course code counterpart
Subject teaching information						
Abdullah Ahmed Sheikho						**course Name of the : teacher(s)**
assistant professor						**:Academic title**
						Year of obtaining the title
Master's						**:Certificate**
						Year of obtaining the certificate

	Number of years of experience (teaching)

General description of the course

The Quantity Surveying course at the first level focuses on techniques for estimating quantities of materials required for construction work, and includes topics such as area and volume measurements, use of bills of quantities, and preliminary cost estimation. Students can Going into details such as professional standards and practices to ensure accuracy in their estimates, helps them build a strong foundation in the field.

General objectives

to understand The student learns the principles of estimating quantities, developing *
. his skills in using the tools and techniques necessary to measure materials
.To increase the student's ability to prepare quantity tables accurately *
Students will be able to analyze costs and apply professional standards to achieve *
accurate and effective results in construction projects.

Specific objectives

- **To familiarize students with the basic concepts of quantity surveying and construction estimation.**
- **Students are trained to use the tools and software needed to accurately measure quantities.**
- **learn how to prepare comprehensive and reliable bills of quantities for construction projects.**
- **will be able to accurately estimate costs based on estimated quantities.**
- **Applying standards: Introducing students to the standards and practices followed in the construction industry to ensure accurate estimation.**

Behavioral objectives or learning outcomes

- understand the basic terms and principles of quantity surveying.
- Students will be able to accurately measure quantities of materials using appropriate surveying tools.
- Students will be able to prepare comprehensive and accurate bills of quantities for construction projects.
- Students will be able to analyze quantities and costs to provide accurate estimates for projects.
- Students will understand the professional standards and practices used in quantity estimation in the construction industry.
- Students will be able to work within a team to prepare accurate estimates and implement projects.
- Students will have the skills to analyze information and make data-based decisions to improve the accuracy of their estimates.

Prerequisites

- **The student must be familiar with arithmetic operations and solving equations .**

Evaluation mechanism	Behavioral objectives or basic learning outcomes	
Daily, monthly and end-of-course practical exams and reports	**Understanding the properties of basic materials**: Study the physical and mechanical properties of materials used in construction, such as concrete, steel, and wood. □	T

		1
		2
		3
		4

Teaching Methods (Select a variety of teaching methods to suit student needs and (course content

Reasons for selection	style or method
.The course is practical and theoretical	**25. Theoretical and practical lectures**
	26.
	.3
	.4
	.5
	.6

M	A	N	number Watches weekly	Course system weeks 15	Scientific Department Environmental and Water Resources Technologies
3	2	1			
Construction Materials				Phase 2	Subject vocabulary Quantity survey

- :The objective of the material

The course generally aims to introduce and teach the student about the different construction materials and concrete used, their types and how to cure them, as well as how to estimate the quantities used in irrigation and drainage projects, especially with regard to cladding , and to calculate the quantities required for that, and to review the special specifications and conditions of general contracting and contracts and their types, and to calculate the . estimated period for engineering works

. Binding materials: cement mortar , gypsum	First week
Estimation, its definition, analysis of preliminary investigations of the business and the number before estimation, benefits of the estimation . process	Week 2 + Week 3
Estimation, its definition, analysis of preliminary investigations of the business and the number before estimation, benefits of the estimation . process	Week 4
.Explain how to analyze prices, including estimating materials and labor	Week 5 + Week 6
Explanation of the table of quantities, exercises on analyzing prices according to different units (volume , Area, Lengths, numbers) for . building works	Week 7 + Week 8
Explaining how to calculate soil quantities for dam works and sprinkler . and drip irrigation networks, with practical examples	Week 9
Explanation of the work of reinforcement iron and wood (the template) Calculating the amount of reinforcing steel and wood for an irrigation ,(. facility	Week 10 + Week 11
Network diagrams (critical path method) for scheduling construction projects. Use this method to follow up and control project . implementation with practical examples	Week 12
General terms and conditions for contracting, subcontractors , . maintenance period, initial and final acceptance of the project	Week 13 + Week 14
Instructions for contractors regarding fines and predecessor Irrigation Law and Instructions for the Management of Irrigation . Projects	Week 15