Ministry of Higher Education and Research Scientific
Supervision and Evaluation Authority
Quality Assurance and Academic Accreditation Department
Department of International Academic Accreditation

Academic Program Description Form for Colleges
2021-2022

University name: Anbar University
College Name: Engineering
Scientific Department: Dams and Water resources Engineering
File filling date: 10/11/2021

Dr. Haitham Kamel Daoud	Dr. Mohamed Abdel Ahmed	Dr. Amir Abdul Rahman Hilal
The Director of the Division Quality Assurance and University Performance	The Associate Dean for Scientific Affairs	The Dean of the College
12/ 11 /2021	12/ 11 /2021	12/11 /2021

Director of Quality Assurance and University Performance
Signature:
Date: 12/11/2021

Academic Program Description Form

Reviewing the performance of higher education institutions
((review of the academic program))

This description of the academic program provides a brief summary of the most important characteristics of the program and the learning outcomes expected of the students to achieve, demonstrating whether he/she has made maximum use of the available opportunities. It is accompanied by a description of each course within the program

1. The educational institution	University of Anbar
2. University Department/Center	College of Engineering
3. Academic Program	Dams and Water Resources Engineering
4. The name of the final certificate	Bachelor of Dams and Water Resources Engineering
5. The academic system	Semester
6. Accredited Accreditation Program	N/A
7. External influences	N/A
8. The date of preparing the description	10/11/2021

9. Academic Program Objectives:

1- Preparing graduates specialized in dams and water resources engineering who contribute to the development of the country.
2- Meeting the needs of multiple sectors in the field of dams and reservoirs with highly qualified staff.
3- Encouraging distinguished people in this field to work as teaching assistants in the department so that they can be faculty members in the future.
4- Graduates of the department have the ability to develop and hold senior positions.
5- Graduates of the department have the ability to pursue postgraduate studies to participate in academic work and scientific research.

10. Required learning outcomes and teaching, learning and evaluation methods

A. Knowledge and Understanding:

1. Knowledge in mathematics, science and engineering.
2. The ability to design and conduct experiments, as well as to analyze and interpret data.
3. Knowledge of contemporary issues.
4. Understand professional and ethical responsibilities.

B. Subject-specific skills:

1. The ability to work with a multidisciplinary team.
2. The ability to identify, formulate and solve engineering problems includes the ability to evaluate and synthesize information and develop alternative solutions.
3. The ability to express ideas clearly, prepare written reports, graphical reports, and make written and oral presentations.
4. The ability to use the necessary modern engineering techniques, skills, and tools.

11. Program Structure:

Credit Hours and Unites				Course Code	Course Name	Level/Year
Weekly hours	**Weekly hours**					
	Lec.	**Tut.**	**Lab.**			
3	3	1	-	DWE1201	Calculus-1	**First Year 1st Course**
4	3	1	3	DWE1203	Physics -1	
4	3		3	DWE1205	Chemistry	
3	2	1	3	DWE1302	Engineering Geology	
3	3		-	DWE1101	Arabic Language	
3	2	1	3	DWE1209	Computer Science	
20	**16**	**4**	**12**	**Total**		
3	3	1	-	DWE2211	Calculus-3	**Second Year 1st Course**
3	3	1	-	DWE2304	Dynamics	
3	3	1	-	DWE2311	Electric Circuits	
2	1	1	3	DWE2306	Engineering surveying I	
3	2	-	3	DWE2307	Technology Building Materials	
3	3	-	-	DWE2103	English Language-2	
17	**15**	**4**	**6**	**Total**		
3	2	1	3	DWE3214	Engineering Numerical Methods	**Third Year 1stCourse**
3	3	1	-	DWE3315	Hydraulic Machine	
3	2	1	3	DWE3313	Strength of materials	
2	2	1	-	DWE3317	Engineering Hydrology	
2	2	1	-	DWE3314	Open Chanel	
3	2	2	3	DWE3316	Soil Mechanics I	
16	**13**	**7**	**9**	**Total**		
2	2	2	-	DWE4323	Introduction to reinforced concrete structures	**Fourth Year 1st Course**
2	2	2	-	DWE4324	Economic of water resources I	
3	3	1	-	DWE4322	Sanitary and Environmental Engineering	
3	3	1	-	DWE4326	Design of Dams	
2	2	2	-	DWE4327	Foundations Engineering I	

2	2	-	-	DWE4328	Senior Design I	
3	3	-	-	-	DWE Elective Class	
3	3	-	-	-	DWE Elective Class	
20	**20**	**8**	**-**	**Total**		
3	3	1	--	DWE1202	Calculus-2	**First Year 2nd Course**
4	3		3	DWE1204	Physics -2	
3	3	1	-	DWE2303	Statics	
4	3	1	3	DWE1210	Engineering Drawing	
3	3		--	DWE1102	English Language-1	
2	2	-	-	DWE2104	Human Rights	
20	**17**	**3**	**6**	**Total**		
3	3	1	-	DWE2212	Calculus-4	**Second Year 2nd Course**
2	2	-	-	DWE2308	Construction for Water Resources Projects	
3	2	1	3	DWE2309	Concrete Technology	
2	1	1	3	DWE2310	Engineering surveying II	
3	3		----	DWE2213	Engineering Statistics	
3	2	1	3	DWE2305	Fluid mechanics	
2	2	-	-	DWE2105	Democracy	
18	**15**	**4**	**9**	**Total**		
3	2	2	3	DWE3316	Soil Mechanics II	**Third Year 2nd Course**
3	3	2	-	DWE3319	Engineering Management & Economy	
3	2	1	3	DWE3320	Hydraulic Structures	
3	3	-	-	DWE3321	Theory of Structures	
3	2	1	3	DWE3312	Water quality control	
2	2	-	-	DWE3106	Administration and Leadership skills	
17	**14**	**6**	**9**	**Total**		
3	3	1	-	DWE4329	Method of Construction and Estimation	**Fourth Year 2nd Course**
2	2	2	-	DWE4331	Design of Reinforced Concrete Hydraulic Structures	
2	2	2	-	DWE4325	Irrigation engineering	
2	2	2	-	DWE4332	Foundations Engineering II	
3	3	1	-	DWE4333	Safety, and Operation of Dams	
1	-	-	3	DWE4334	Senior Design II	
2	2	2		DWE4330	Economic of water resource II	
3	3	-	-	-	DWE Elective Class	
18	**17**	**10**	**3**	**Total**		

12. Degrees: Bachelor

13. Planning for personal development:

1. Knowing and studying how to analyze engineering obstacles and link them to reality to direct the student's thought towards practical life.
2. Analyzing the results and comparing them with reality to what extent they match the actual design values.

3. Analyzing the results obtained by the student by conducting practical reports and determining the extent of their reality.

14. <u>Admission standard (establishing regulations related to admission to the college or institute):</u>

The student must have an average of no less than 85% in the subjects of mathematics and physics, and the number of students in one stage must not be less than 10 and not more than 40.

15. The most important sources of information about the program: ABET requirements.

Course Description Form

CALCULUS I

This course description provides a brief summary of the most important characteristics of the course and the learning outcomes expected of the student to achieve.
Prove whether he has made the most of the available learning opportunities. It must be linked to the description of program.

1 Educational institution	Anbar University
2 University Department / Center	Dams and Water Resources Engineering
3 Course Name/Code	Calculus 1/DWE1205
4 Programs in which he enters	Bachelor
5 Available Attendance Forms	Classroom presence
6 Semester / Year	2023-2022
7 Number of Credit Hours (Total)	4
8 The history of preparation of this description	1/9/2021
9 Course Objectives : 1. Solve problems using the Fundamental Theorem of Calculus. 2. Evaluate Limits of the functions and their continuity.	

3. Find the derivative of algebraic, trigonometric, exponential, and logarithmic functions.
4. Sketch the graph of a function using the information for the first and second derivatives
5. Solve problems involving applications of integrals including finding volume of solids of revolution and area between curves

10 Learning outcomes and teaching, learning and assessment methods

أ- Knowledge and understanding

1. Identify the basic types of mathematical functions and their derivatives
2. Expanding students' perceptions and enhancing the concept of mathematical applications by giving them general principles and concepts about the importance of these applications in engineering fields.

Subject-specific skills

1. Detailed study of mathematical equations
2. Study the sports topics that the student needs in the future in the labor market

Teaching and learning methods

1. Lecture and Presentation
2. Solve examples, discuss and apply exercises
3. Daily surprise and weekly tests
4. Individual homework and reports

Evaluation methods

1. Evaluate students individually by giving an opportunity for classroom participation
2. Evaluation collectively through exams of all kinds
3. Final Exams

Thinking skills

1. Analysis of problem-solving results
2. Linking mathematical equations and models with realistic engineering applications

Evaluation methods

The evaluation is based on

1. Monthly exams 20%
2. Daily 10%
3. Duties 5%
4. Daily participation in class 5%
5. Final Exam 60%

D - General and transferred skills (other skills related to employability and personal development).

There is only English language usage

11 Course Structure

The week	Hours	Required Learning Outcomes	Name of the unit/course or topic	Method of education	Evaluation method
First	4	General definitions and the formation of sports models	Functions and models: four ways to represent a function , mathematical models: a catalogue of essential functions	theoretical	Homework
Second	4	Goals and calculation	new functions from old functions , exponential functions, inverse functions and logarithms		Quick Exam
Third	4	Purpose calculations in different ways	Limits: the tangent and velocity problems. The limit of a function, calculating limits using the limit laws.		Obligatory + City Exam
Fourth	4	Introduction to Mustaqsitat	Continuity, limits at infinity, horizontal asymptote. Infinite limits, vertical asymptotes. derivatives and rates of change		Homework
V	4	Methods for calculating the derivative	Differentiation rules: Differentiation of Polynomials. The Product and Quotient Rules. Derivatives of Trigonometric Functions.		Quick Exam
Sixth	4	Additional rules on derivatives	The Chain Rule, Implicit Differentiation.		Homework + Quick Exam
Seventh	4	The relationship of time and its issues	Related Rates		Obligatory + City Exam
Eighth	4	Applications regarding endings	Applications of differentiation: maximum and		Discussion + Questions

			minimum values. The mean value theorem. How derivatives affect the shape of a graph		+ Homework
Ninth	4	Drawing functions and their applications	Summary of curve sketching.		Homework + Quick Exam
X	4	Optimization in engineering materials and applications related to specialization	Optimization . problems. Antiderivatives , Indeterminate forms and l'Hospital's rule.		Discussion + Questions + Homework
Eleventh	4	Integrals and their theory	Integrals: the definite integral. The fundamental theorem of calculus.		Discussion + Questions + Homework
Twelfth	4	Definite and indefinite integrals	The indefinite integral and net change theorem. The substitution rule		Homework + Quick Exam
Thirteenth	4	Integration Applications	Applications of integrals: areas between curves. Volumes.		Obligatory + City Exam
Fourteenth	4	Sizes	Volumes by cylindrical shells. Average value of a function		Homework
Fifteenth	-	Final Exam and Assessment	Final Exam		-

12Infrastructure	
Required readings: ▪ Course Books ▪ Other	Calculus, Early Transcendental By James Stewart, 8th Edition, 2016, Cengage Learning
Special requirements	None
Social services (e.g. guest lectures, vocational training and field studies)	None

13 Acceptance	
Prerequisites	None
Minimum number of students	20
The largest number of students	40

Physics

Course description

This is the first course in the two-semester sequence of calculus-based introductory physics courses designed to meet the needs of student majoring in Engineering. The course is a survey of the concepts, principles, methods and major findings of classical Physics. Primarily, it covers Newtonian mechanics, and thermal Physics, with topics include: Physics and measurement, Vectors, kinematics and dynamics of motion of a single particle in one and two dimensions, work and energy, system of particles, linear momentum and collisions, kinematics and dynamics of rotational motion, equilibrium of rigid bodies, and elasticity, fluid static and fluid dynamics, oscillatory motion, wave motion, and temperature and thermal equilibrium.
The subject matter of the course will be covered in The Lab-based section which presents an introduction to the methods of experimental physics emphasis is on developing student's skills in experimental techniques, data analysis, and scientific reporting of lab work. During the course students execute a series of experiments on Kinematics of motion, kinetic and potential energy, Oscillatory motion, Thermal properties of matter, and Viscosity. The course includes computer based experiments on Classical Mechanic

University of anbar-college of engineering	**١ـ المؤسسة التعليمية**
Dams and Water resources dep.	**٢ـ القسم الجامعي / المركز**
DWE1203	**٣ـ اسم / رمز المقرر**
بكالوريوس	**٤ـ البرامج التي يدخل فيها**

٥- أشكال الحضور المتاحة	دوام رسمي
٦- الفصل / السنة	First semester 2023-2024
٧- عدد الساعات الدراسية (الكلي)	84
٨- تاريخ إعداد هذا الوصف	٢٠٢١/٠٩/٢٠

٩- أهداف المقرر :

a. developing student's skills in experimental techniques data analysis, and scientific reporting of lab work.
b. The course is a survey of the concept, principles, methods and major findings of classical physics.

١٠- مخرجات التعلم وطرائق التعليم والتعلم والتقييم:

أولا: الأهداف المعرفية:

1- Developing students' skills in analyzing practical information and preparing the scientific report in the laboratory.
2- Expanding students' awareness and reinforcing the concepts and principles of classical physics.

ثانيا: الأهداف المهاراتية الخاصة بالمقرر:

1 - Detailed study.
2 - Study the mathematical details that the student needs while studying the subject.
3- Engineering preparation to be a successful engineer by learning the correct principles of his specialty.

أ- طرائق التعليم والتعلم :

1- Providing students with the basics and topics related to previous educational outcomes and the skills to solve practical problems by giving, lecturing, or conducting experiments.
2- Solving a group of practical and applied examples by the subject teacher.
3- Through discussion, students participate in solving some practical problems.
4- Daily surprise and continuous weekly tests.
5- Directing students to some websites to benefit from them.

ب- طرائق التقييم :

1- Evaluating students individually by giving them an opportunity to participate in the class by answering questions.
2- Evaluating students collectively through daily exams with practical and theoretical questions.

3- Evaluating students collectively by giving extracurricular assignments, such as writing reports or doing assignments.
4- Permanent monthly exams for students to evaluate their general performance and understanding of the subject.
5- Final exams for the first and second round.

ج- مهارات التفكير :

1- Presenting movement problems in a schematic form of the physical system using the Free Body Diagram method.
2- Solve problems related to simple rotational motion.
3- Analyzing the results obtained by the student by conducting practical reports and determining the extent of their reality

د- طرائق التعليم والتعلم :

1- Using modern means to present the scientific and theoretical aspect, such as Data Show devices, to attract attention and attract students so that the idea reaches the student better.
2- Giving students extra-curricular assignments that require them to exert skills and self-explanations in experimental ways.
3- Interrogating students through discussion sessions by asking intellectual questions such as: (how, why, when, where, which) for specific topics.
4- Using the method of brainstorming and mental nutrition in order to activate the accumulated experiences of students by linking the subjects taken in the pre-university educational levels and linking them to the new ones.
5- Providing students with practical skills by linking their studies to practical reality.

ه- طرائق التقييم :

يتم التقييم على أساس:
1- Monthly exams: 20%
2- Daily exams: 10%
3- Duties: 5%
4- Commitment to working hours + daily participation: 5%
5- Laboratory 10%
5- Final exam: 50%

و - المهارات العامة والمنقولة (المهارات الأخرى المتعلقة بقابلية التوظيف والتطور الشخصي):

1- Enabling students to master the subject in its applied and cognitive aspects.
2- Developing the student's ability to analyze information and interpret the data he obtained by linking the topic he learned with practical reality.
3- Enabling the student to use the specific and general equations of the subject and how to benefit from them in analyzing issues and extracting results accurately.
4- Enabling the student to conduct practical experiments in the laboratory that are related to the course.

١١- بنية المقرر:

الأسبوع	الساعات	مخرجات التعلم المطلوبة	اسم الوحدة / المساق أو الموضوع	طريقة التعليم	طريقة التقييم
الأول	٣	**تعريف عام للموضوع**	*Introduction,*	نظري	**مناقشة ،امتحان سريع، حل مسائل , واجب بيتي**
الثاني	٣		Physics and measurement	نظري	**مناقشة ،امتحان سريع، حل مسائل , واجب بيتي**
الثالث	٣		Dynamics of motion of a single particle	نظري	**مناقشة ،امتحان سريع، حل مسائل , واجب بيتي**
الرابع	٣		Work and energy	نظري	**مناقشة ،امتحان سريع، حل مسائل , واجب بيتي**
الخامس	٣		System of particles	نظري	**مناقشة ،امتحان سريع، حل مسائل , واجب بيتي**
السادس	٣		Kinematics and Dynamics of rotational motion	نظري	**مناقشة ،امتحان سريع، حل مسائل , واجب بيتي**
السابع	٣		Phases of matter	نظري	**مناقشة ،امتحان سريع، حل مسائل , واجب بيتي**
الثامن	٣		Oscillating systems	نظري	**مناقشة ،امتحان سريع، حل مسائل , واجب بيتي**
التاسع	٣		**Quiz + resolve problems** Types of waves	نظري	**مناقشة ،امتحان سريع، حل مسائل , واجب بيتي**
العاشر	٣		Macroscopic and microscopic description of matter	نظري	**مناقشة ،امتحان سريع، حل مسائل , واجب بيتي**
الحادي عشر	٣		Measurements and Data Analysis	نظري	**مناقشة ،امتحان سريع، حل مسائل , واجب بيتي**
الثاني عشر	٣		Analyzing the kinematic components of 1Dmotion by using motion sensor	نظري	**مناقشة ،امتحان سريع، حل مسائل , واجب بيتي**
الثالث عشر	٣		Determination of the Acceleration of Gravity by studying Free fall	نظري	**مناقشة ،امتحان سريع، حل مسائل , واجب بيتي**

الرابع عشر	٣		Verification of Newton's Second Law	نظري	**مناقشة ،امتحان سريع، حل مسائل , واجب بيتي**
الخامس عشر	٣	امثلة ومراجعة	- **Quiz + resolve questions** *Examples*	نظري	**مناقشة ،امتحان سريع، حل مسائل , واجب بيتي**
		1st Course Exam			

١٢- البنية التحتية :	
القراءات المطلوبة : ▪ كتب المقرر ▪ اخرى	R.D. Knight, Physics for Scientists and Engineers, 2nd ed., Pearson 2008 Laboratory Manual, Compiled by Instructor
متطلبات خاصة	لا يوجد
الخدمات الاجتماعية (وتشمل على سبيل المثال محاضرات الضيوف والتدريب المهني والدراسات الميدانية)	لا يوجد

١٣- القبول :	
المتطلبات السابقة	
أقل عدد من الطلبة	١٠
أكبر عدد من الطلبة	٤٠

Democracy

Course description

This course description provides a summary of the most important characteristics ,of the course and the learning outcomes that the student is expected to achieve demonstrating whether he or she has made the most of the learning opportunities available. It must be linked to the program description

College of Engineering/ Anbar University	**١- Educational institution**
Department of Dams and Water Resources Engineering	**٢- University department/center**
DWE2105	**٣- Course name/code**
Bachelor's	**٤- The programs in which he participates**
Official working hours	**٥- Available forms of attendance**
first academic year/ First semester	**٦- Semester/year**
hours ٣٠	**٧- Number of study hours (total)**
_ ٢٠٢١/١٩/٩	**٨- The date this description was prepared**
٩- Course objectives :The definition of a university student is as follows Knowledge of human rights and the rights of other human beings, these rights approved by .divine laws and then man-made laws at all international, regional and national levels	

Then know what public freedoms are, why they are called public, and what freedoms are recognized by divine laws and then in regional and national charters, so that they can be enjoyed .and exercised in their correct form without violating the freedoms of others

Then learn about his country's political system by learning about the democratic system .practiced by most countries in the world, which is a guarantee of rights and freedoms

: **A : No: Cognitive objectives**

- Understanding, knowing, and realizing his rights that God has granted to him and to all humankind, and therefore they are a gift and not a gain from anyone, and no one has the .right to take them away
- . The student expresses and defends these rights in his own way
- Explaining the phenomena and giving explanations for the violations of human rights and freedoms that occur before him by identifying the deficiencies or gaps that exist in light .of the information available to him
- Understanding the most important political system that guarantees human rights and .political freedoms, and trying to implement it on the ground, which is the democratic system

secondly: Skills objectives ofthe : course

- The learner must have the ability to analyze the basic concepts of the subject, which includes the ability to observe, make logical connections, abstract and judge knowledge, and .work with knowledge to address problems and choose ideas that help solve them

:Third: Emotional and value goals

- Consolidating these rights and freedoms among the learner and teaching him that these rights and freedoms are not absolute, but rather are determined by the rights and freedoms of others and not to violate them, and therefore every right has a corresponding duty that we are .committed to implementing
- Adapting the lessons of human rights, public freedoms and democracy to be consistent with the culture of human rights and public freedoms and strengthening them with realistic examples while stimulating collective national awareness and spreading a spirit of hope and optimism for a bright future for our countries and staying away from delving into the direct political aspects of parties and other negative expressions, as well as staying away from descriptions. Sectarian or ethnic, personalization of events and their repercussions. Promoting the spirit and values of tolerance and national belonging, rejecting all forms of division and division, and inciting efforts towards upholding the spirit and content of the idea of .citizenship and building a modern, contemporary civil state

: A- Teaching and learning methods

. The introductory method -١

.Dialogical method -٢

.Test method -٣

: B- Evaluation methods

.Initial evaluation (by adopting the direct dialogue method) -١
.Continuous evaluation (by conducting a set of exams with multiple options) -٢
Diagnostic evaluation (by conducting scheduled tests at specific times and assigning the coating -٣
.(to perform specialized projects
.Final evaluation -٤

: C- Thinking skills

- .The learner uses the information in real life situations
- Using knowledge to implement projects or change incorrect laws, for example, or for non-governmental organizations to defend human rights.
- Improving writing skills, problem solving, dialogue skills, and the ability to work cooperatively with others in different fields.

: D- Teaching and learning methods

Data Show devices, to attract attention and attract students so that the idea reaches the student better.
Giving students extra-curricular assignments that require them to exert skills and self- -٢ explanations in experimental ways.
:Interrogating students through discussion sessions by asking intellectual questions such as -٣ .(how, why, when, where, which) for specific topics
Using the method of brainstorming and mental nutrition in order to activate the accumulated -٤ experiences of students by linking the study materials that were taken in the pre-university educational levels and linking them to the new ones.
.Providing students with practical skills by linking their studies to practical reality -٥

: E- Evaluation methods

:The evaluation is done on the basis of
Monthly exams: 20% -١
Daily exams: 10% -٢
Duties: 5% -٣
Commitment to working hours + daily participation: 5% -٤
Final exam: 60% -٥

F - General and transferable skills (other skills related to employability and personal : (development

.Enabling students to make the right decision as quickly as possible - ١
Enabling students to pass professional tests organized by local authorities - ٢.
Enabling students to continue self-development after graduation to keep pace with - ٣ .developments in their field of specialization

: Course structure -١١					
Evaluation method	**Teaching method**	**Name of the unit/course or subject**	**Required learning outcomes**	**hours**	**the week**
Discussion, quick quiz	theoretical	**Definition of freedom**	**The student understands the lesson**	٢	the first
Discussion, quick quiz	theoretical	**The concept of freedom in Islam**	**The student understands the lesson**	٢	the second
Discussion, secret exam	theoretical	Definition of democracy	**The student understands the lesson**	٢	the third
Discussion, quick quiz	theoretical	Freedoms in Islam and their types	**The student understands the lesson**	٢	the fourth
discussion	theoretical	Civil liberties	**The student understands the lesson**	٢	Fifth
, discussion Written test	theoretical	First month exam	**The student understands the lesson**	٢	VI
discussion	theoretical	Freedom of speech	**The student understands the lesson**	٢	Seventh
, discussion Written test	theoretical	Freedom to learn	**The student understands the lesson**	٢	VIII
Discussion, quick homework , exam	theoretical	Political freedom	**The student understands the lesson**	٢	Ninth
, discussion Written test	theoretical	Dialogue and its impact on applying the principle of freedoms	**The student understands the lesson**	٢	The tenth
Discussion, quick homework , exam	theoretical	International Bill of Human Rights	**The student understands the lesson**	٢	eleventh
, discussion Written test	theoretical	Second month exam	**The student understands the lesson**	٢	twelveth
Data Show General				٢	Thirteenth

Review	٢	fourteenth

: Infrastructure -١٢	
Human rights and their guarantees in Islam	:Required readings Course books ▪ Other ▪
nothing	Special requirements
nothing	social services Includes, for example, guest lectures, professional) (training, and field studies

: Acceptance -١٣	
	Prerequisites
١٠	The smallest number of students
٤٠	The largest number of students

Engineering Geology

Module Description Form

Module Information		
Module Title	**Engineering Geology**	**Module Delivery**
Module Type	**Core**	☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial**
Module Code	**DWE1303**	
ECTS Credits	**5**	

SWL (hr/sem)	**125**	☐ **Practical** ☐ **Seminar**	
Module Level	1	**Semester of Delivery**	2
Administering Department	Type Dept. Code	**College**	Type College Code
Module Leader	Rafid Saadoon Rashid	**e-mail**	Rafid.alboresha@uoanbar.edu.iq
Module Leader's Acad. Title	Assistant Professor	**Module Leader's Qualification**	Ph.D.
Module Tutor	Name (if available)	**e-mail**	E-mail
Peer Reviewer Name	Name	**e-mail**	E-mail
Scientific Committee Approval Date	01/06/2021	**Version Number**	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

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

Module Aims, Learning Outcomes and Indicative Contents

Module Objectives أهداف المادة الدراسية	1. To study and identify different types natural materials like rocks & minerals. 2. To know the physical properties of rocks & minerals. 3. Have knowledge about geohazards, earthquakes, and tunneling. 4. To know the importance of geological maps.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understand the basic concept of geology. 2. Understand the formation of rocks and structural features. 3. Apply acquired knowledge in dams and water resources engineering projects such as dams, tunnels and slopes.. 4. Have skills to understand geological survey maps. 5. be able to identify potential problems associated with: slope stability; drilling a tunnel; construction of a dam. 6. Ability to work in a group.
Indicative Contents المحتويات الإرشادية	

Learning and Teaching Strategies

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

Student Workload (SWL)

Structured SWL (h/sem)	63	**Structured SWL (h/w)**	4
Unstructured SWL (h/sem)	62	**Unstructured SWL (h/w)**	4
Total SWL (h/sem)	**125**		

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	Introduction - Definition, purpose and scope - The Earth and Its Systems -

Week 2	**Minerals** -Types and clasifications of minerals
Week 3	**Rocks** -Types and cycle of rock formation - geological folds, faults and joints
Week 4	Engineering & physical properties of rocks
Week 5	First Exam
Week 6	**Engineering Maps** (Topographic & Geological Maps)
Week 7	**Geohazards** -ground movements -ground failure
Week 8	-slope unstability -seisms
Week 9	Second Exam
Week 10	**Introduction to Geology of Tunnels & Dams** <u>I- tunnels</u> -types of tunnels. - Methods of tunnel. -tunnel (opening) in massive rock, two dimensional case.
Week 11	-stress distribution around circular opening.

	- required studies for tunnels construction (effect of layers, flods and fault).
Week 12	II- dams -dams importance. -dams types. -required studies for dams construction. -forces affecting dams.
Week 13	required studies for dams construction. -forces affecting dams.
Week 14	Third Exam
Week 15	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

	Material Covered
Week 1	Lab 1: Minerals description
Week 2	Lab 2: Minerals classification
Week 3	Lab 3: Rocks description
Week 4	Lab 4: Rocks classification
Week 5	Lab 5: 6.Volume & Density measurement of rocks
Week 6	Lab 6 Specific Gravity & porosity measurement of rocks
Week 7	Lab 7: Uniaxial Compressive Strength
Week 8	Lab 8: Drawing Engineering Geological Maps

Learning and Teaching Resources

	Text	**Available in the Library?**
Required Texts	• Terry R. West, Geology Applied to Engineering, Waveland Press, 1995.	Yes

Recommended Texts	• Engineering Mechanics (Statics & Dynamics) / Fourth Addition By : R. C. HIBBELER	No
Websites		

Grading Scheme

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

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

Arabic

Course description

This course description provides a summary of the most important characteristics of the course and the learning outcomes that the student is expected to achieve, demonstrating whether he or she has made the most of the learning opportunities available. It must be linked to the program description

Anbar University/ College of Engineering	**Educational institution -١**

Department of Dams and Water Resources Engineering	**University -٢ department/center**
DWE1101	**Course name/code -٣**
Bachelor's	**The programs in which he -٤ participates**
Official working hours	**Available forms of -٥ attendance**
First semester/ first academic year	**Semester/year -٦**

: **A : No: Cognitive objectives**

A- Knowledge and understanding

Acquiring the vocabulary explained in the field "Topics to be researched and -"covered

Acquiring correct literary writing skills -

Ensure that the student is able to write according to language rules and -punctuation

secondly: Skills objectives ofthe : course

That - ١ Be Skills Self Nature Application and that Accompany the study Theory Saucepan KB Y R M N Training .Practical

_ Attention -٢ With gain requester Skills Addressing technical problems related .to design or analysis, taking into account accuracy and speed of results

Input - ٣ Topics Study Hadith in fields Design and acquisition methods requester Skills New And recommendation spirit . Innovation and modernization

Selection - ٤ Exercises And tests that Prepare For students So that Reflect Problems Which of Expected that He meets her Al Ta L B after His graduation like substitution And replacement And renewal . And the amendment

:Third: Emotional and value goals

Creating a spirit of competition between the student and his peers in a way that - ١ .reflects positively on raising the academic level

Developing the scientific and intellectual capabilities in various engineering - ٢ subjects for distinguished students and implanting the idea of continuing learning .for all

Try as much as possible to find cooperation formulas between the educational -٣ .institution and production sites

: A- Teaching and learning methods

. The introductory method -١
.Dialogical method -٢
.Test method -٣

: B- Evaluation methods

.Initial evaluation (by adopting the direct dialogue method) -١
.Continuous evaluation (by conducting a set of exams with multiple options) -٢
Diagnostic evaluation (by conducting scheduled tests at specific times and -٣
.(assigning the coating to perform specialized projects
.Final evaluation -٤

: C- Thinking skills

C1- Developing the student's ability to work on performing assignments and .submitting them on the scheduled date
.C2- Analytical literary thinking capable of analyzing literary texts
.C3- Developing the student's ability to dialogue and discuss

: D- Teaching and learning methods

Data Show devices, to attract attention and attract students so that the idea reaches .the student better
Giving students extra-curricular assignments that require them to exert skills -٢ .and self-explanations in experimental ways
Interrogating students through discussion sessions by asking intellectual -٣ .questions such as: (how, why, when, where, which) for specific topics
Using the method of brainstorming and mental nutrition in order to activate the -٤ accumulated experiences of students by linking the study materials that were taken .in the pre-university educational levels and linking them to the new ones
Providing students with practical skills by linking their studies to practical -٥ .reality

: E- Evaluation methods

:The evaluation is done on the basis of
Monthly exams: 20% -١
Daily exams: 10% -٢
Duties: 5% -٣
Commitment to working hours + daily participation: 5% -٤
Final exam: 60% -٥

F - General and transferable skills (other skills related to employability and : (personal development

١- Developing the student's ability to deal with technical means.

٢- Developing the student's ability to deal with literary texts.

٣- Developing the student's ability to deal with multiple media.

٤- Developing the student's ability to dialogue and discuss.

: Course structure -١١					
Evaluation method	**Teaching method**	**Name of the unit/course or subject**	**Required learning outcomes**	**hours**	**the week**
Discussion, quick quiz	theoretical	**The hamza at the beginning of speech**	**The student understands the lesson**	**٣**	the first
Discussion, quick quiz	theoretical	**punctuation marks**	**The student understands the lesson**	**٣**	the second
Discussion, secret exam	theoretical	The Arabic dictionary	**The student understands the lesson**	**٣**	the third
Discussion, quick quiz	theoretical	**First month exam**	**The student understands the lesson**	**٣**	the fourth
discussion	theoretical	**Al-Mutanabbi and his poem**	**The student understands the lesson**	**٣**	Fifth
, discussion Written test	theoretical	**A poem by the poet Saleh bin Abdul Quddus**	**The student understands the lesson**	**٣**	VI
discussion	theoretical	**Abu Al-Baqa Al-Randi and his poem**	**The student understands the lesson**	**٣**	Seventh
, discussion Written test	theoretical	Ibn Zuraiq Al-Baghdadi and a poem by him	**The student understands the lesson**	**٣**	VIII
Discussion, quick homework , exam	theoretical	**Truth and metaphor**	**The student understands the lesson**	**٣**	Ninth
, discussion Written test	theoretical	**Second month exam**	**The student understands the lesson**	**٣**	The tenth
Discussion, quick homework , exam	theoretical	**Literature and its types**	**The student understands the lesson**	**٣**	eleventh
, discussion Written test	theoretical	**A for literary doctrines**	**The student understands the lesson**	**٣**	twelveth
Data Show General				**٣**	Thirteenth
Review				**٣**	fourteenth

: Acceptance -١٣	
nothing	Prerequisites
١٠	The smallest number of students
٤٠	The largest number of students
nothing	Special requirements
nothing	social services Includes, for example, guest lectures, professional) (training, and field studies

Applied Physics

Course Description Form

Review The Performance of Higher Education Institutions ((Review of The Academic Program))

Applied physics must be studied because it is one of the basics in the student's understanding of the concepts of physics and basic mathematics, which is an introduction to knowledge of quantum methods, mass, concepts of momentum and energy movement

1. Educational Institution	University of Anbar/College of Engineering
2. University Department/Center	Dams & Water Resources Department

3. Course Name/Code	Applired Physics
4. Program	Bachelor
5. Available Attendance Form	Full Time
6. Semester/Year	Second Term/2022-2023
7. Number of Credit Hours	٧٥
8. Date of Description Preparation	9/10/2021

9. Course Objectives:

- Its basic and prominent role in teaching the student to understand basic physics, measurement, the motion of one particle in one dimension and then the kinetics of projectiles and circular motion.

- Teach students to apply and understand Newton's laws of motion.
- Teaching students the concepts of fluid motion within Newton's kinetic laws.

10.Learning outcomes and teaching, learning and assessment methods

First: Cognitive Objectives:

1- Learn about the method of measurement and basic units .
2- Laws of fluids and gases.
3- Laws of energy transfer.
4- Flow laws for water.
5- Identify thermal equilibrium and its engineering applications.

Second: Course Skills Objectives :

1. Learn to use and method physical quantitative measurement.
2. Encouraging the student's skills to use different measurement systems and units.
3. Expanding academic vocabulary through the use of different methods and laws of movement, rotation and heat.
4. Encouraging the student to use laboratory equipment to measure the mass, density or viscosity of materials and fluids.
5. Encouraging the student's thinking skills

Teaching And Learning Methods

1. Providing students with the basics and topics related to previous education outcomes through recitation or lecture and practical application.
2. Solve a set of examples by the subject teacher.
3. Expanding the discussion with the participation of students .
4. Sudden daily and continuous weekly tests .
5. Guiding students to some websites to benefit from them

Evaluation Methods

1. Evaluating students individually by giving an opportunity for classroom participation by answering questions.
2. Evaluating students collectively through daily exams with practical and theoretical questions.
3. Evaluating students collectively by giving extracurricular duties such as writing reports or solving assignments.
4. Permanent monthly exams for students to evaluate their overall performance and understanding of the material.
5. Final exams for the first and second attempts.

Thinking Skills

1. Know and study how to use different methods and systems for physical units .
2. Encouraging the student to identify different types of measurement methods and calculate quantities.

Teaching And Learning Methods

1. Using modern means to display the scientific and theoretical side, such as Data Show devices to attract attention and attract students to better reach the idea to the student.
2. Giving students extracurricular assignments that require them to exert skills and self-explanations in experiential ways.
3. Interrogate students through panel discussions by asking thinking questions (how, why, when, where, any) for specific topics.
4. Using the brainstorming method and feedback in order to activate the accumulated experiences of students by linking the subjects.

Evaluation Methods

The evaluating according to:

1. Monthly Quizzes 20%
2. Quick Quizzes 10%
3. Assignments 5%
4. Attendance +Participations 5%

5. Labs	10%
6. Final Exams	50%

General and transferable skills (other skills related to employability and personal development).

1. Enable students to apply physics in its applied and cognitive aspects .
2. Develop the student's ability to analyze information and interpret the data obtained by linking the subject he learned with the previous knowledge store.

11. Course Structure					
Week	**Hours**	**Required Learning Outcomes**	**Name of the Unit/Course or Topic**	**Method of Education**	**Evaluation Method**
1	5	Student understands lesson	Physics and Measurements	Thermotical & Practical lecture	Discussion, quick exam, solving problem and home works
2	5	Student understands lesson	Motion in one Dimension	Thermotical & Practical lecture	Discussion, quick exam, solving problem and home works
3	5	Student understands lesson	Vectors	Thermotical & Practical lecture	Discussion, quick exam, solving problem and home works
4	5	Student understands lesson	Motion in two Dimensions	Thermotical & Practical lecture	Discussion, quick exam, solving problem and home works
5	5	Student understands lesson	State the Newton's three laws of motion and apply them to solve problems on one dimensional translational motion.	Thermotical & Practical lecture	Discussion, quick exam, solving problem and home works
6	5	Student understands lesson	State the Newton's three laws of motion and apply them to solve problems on two-dimensional translational motion.	Thermotical & Practical lecture	Discussion, quick exam, solving problem and home works
7	5	Student understands lesson	Circular Motion	Thermotical & Practical lecture	Discussion, quick exam, solving problem and home works
8	5	Student understands lesson	Laws of motion	Thermotical & Practical lecture	Discussion, quick exam, solving problem and home works

9	5	Student understands lesson	solving problems of static equilibrium.	Thermotical & Practical lecture	Discussion, quick exam, solving problem and home works
10	5	Student understands lesson	Analyze the problems of static fluid in terms of density and pressure	Thermotical & Practical lecture	Discussion, quick exam, solving problem and home works
11	5	Student understands lesson	Fluid at motion using the continuity equation and Bernoulli's equation.	Thermotical & Practical lecture	Discussion, quick exam, solving problem and home works
12	5	Student understands lesson	Define what is meant by: temperature, specific and molar heats of capacity.	Thermotical & Practical lecture	Discussion, quick exam, solving problem and home works
13	5	Student understands lesson	State zeroth and first laws of thermodynamics and use them to solve some related problems.	Thermotical & Practical lecture	Discussion, quick exam, solving problem and home works
14	5	Student understands lesson	Explain the theory of heat energy transfers and apply it in some simple situations.	Thermotical & Practical lecture	Discussion, quick exam, solving problem and home works
15	5	Student understands lesson	Energy and Energy Transfer	Thermotical & Practical lecture	Discussion, quick exam, solving problem and home works

12. Infrastructure	
References	Physics - Part One - Mechanics and Properties of Matter - Motion and Heat, Rahim Abed ,2018
Special Reequipments	• Density measuring devices • Viscosity measuring devices • Fluid flow meters • Barometric pressure measuring devices
Social services (e.g. guest lectures, vocational training and field studies)	

13. Acceptance	
Prerequisites	---
Minimum Students Numbers	--
Maximum Students Number	57

Concrete Technology

Course Description

Concrete technology

It is a science that specializes in the study of the properties of concrete as a structural material, its manufacture and the development of its resistance to withstand the construction loads. The study of concrete technology aims to teach and train the student the basics of this science and the principles of chemical interaction between cement compounds and the effect of additives on the properties of concrete and how to design different types of ordinary or special concrete mixtures as well as the

study of the properties and tests of concrete in its wet and hardened states. It also prepares the student to explain the phenomena or problems that occur in the concrete structure.

10- Learning outcomes and methods of teaching, learning and evaluation:

First: Cognitive Objectives:

1- Identify the basic compositions of concrete from cement and its types and aggregates.
2- Expanding students' perceptions and enhancing the concept of concrete technology by giving them general principles and concepts about the properties, components and types of concrete mixtures.
3- Giving the student experience in studying the effect and types of concrete additives and their properties.
4- Learn how to design concrete mixtures and calculate their quantities.
5- Learn about the properties of soft concrete and its tests.
6- Identify the properties of hardened concrete and its tests

Second: Objectives and skills of the course:

1 - A detailed study of the science of concrete technology.
2 Study the properties and components of concrete.
3 - Teaching the student after the end of the semester the effect of the quality of concrete in bearing the structural forces.
4- Preparing an engineer to be a successful engineer by learning the correct principles of his specialization.

A- Teaching and learning methods:

1- Providing students with the basics and topics related to the previous learning outcomes of skills to solve practical problems through speech, lecture or experiments.
2- Solving a set of practical and applied examples by the subject teacher.
3- Through discussion, students are involved by solving some practical problems.
4- Sudden daily and weekly continuous tests.
5- Attending in private laboratories and conducting scheduled tests and experiments.
6- Guiding students to some electronic reality to benefit from them.

B- Evaluation Methods:

1- Evaluating students individually by giving an opportunity for classroom participation by answering questions.
2- Evaluating students collectively through daily exams with practical and theoretical questions.
3- Evaluating students collectively by giving extracurricular duties such as writing reports or solving assignments.
4- Permanent monthly exams for students to evaluate their overall performance and understanding of the material.
5- Final exams for the first and second rounds.

C- Thinking skills:

1- Knowing and studying how to analyze the forces acting on objects and linking them to reality to direct the student's thought towards practical life.

2- Analyzing the results of solving problems and comparing them with reality mentally and the extent to which they match the actual design values.

3- Analyzing the results obtained by the student by conducting practical reports and reaching the extent of their truth.

D- Teaching and learning methods:

1- Using modern means in presenting the scientific and theoretical side, such as Data Show devices, to attract attention and attract students to better reach the idea to the student.

2- Giving students extracurricular duties that require them to exert skills and self-explanations in experimental ways.

3- Interrogate students through panel discussions by asking intellectual questions such as: (how, why, when, where, any) for specific topics.

4- Using the method of brainstorming and mental nutrition in order to activate the accumulated experiences of students by linking what has been taken from the subjects taken in the pre-university stages and linking them to the new.

5- Providing students with practical skills by linking their studies to practical reality.

E- Evaluation Methods:

The evaluation is carried out on the basis of:
1- Monthly exams: 20%
2- Daily exams: 10%
3- Duties: 5%
4- Commitment to permanence and daily participation: 5%
5- Participation and practical exams: 10%
6- Final exam: 50 %

F- General and transferred skills (other skills related to employability and personal development):

1- Enabling students of concrete technology in its applied and cognitive aspects.

2- Developing the student's ability to analyze the information and interpret the data obtained by linking the subject he learned with practical reality.

3- Enabling the student to use special and general equations to design concrete mixtures and how to benefit from them in analyzing problems and extracting results accurately.

4- Enabling the student to conduct a field examination to determine the liquid pain that falls on the shoulders of the engineer in the field.

1- Educational institution	Anbar University / College of Engineering
2- University Department / Center	Department of Dams and Water Resources Engineering
3- Course name/code	Concrete Technology / DWE2309
4- Programs in which it enters	Bachelor
5. Available Forms of Attendance	Official working hours
6- Semester/Year	Second Semester / Second Academic Year
7- Number of study hours (total)	48
8. Date of preparation of this description	2021-2022

9- Course Objectives:

A-The student understands the science of concrete technology because it is one of the scientific and applied foundations of dam engineering and water resources.
B - It has an important role in increasing the student's intellectual perceptions to deal with engineering problems and achieve solutions to these problems.
C- Its basic and prominent role in building the design of buildings and facilities related to irrigation engineering and dams.

11. Course Structure:					
The week	**Hours**	**Required Learning Outcomes**	**Name of the unit/course or topic**	**Method of education**	**Evaluation method**
The first	**3**	**Introduction**	General Introduction to Concrete	theoretical	**Discussion, Quick Exam, Problem Solving, Homework**
Second	**3**	**Additives**	Types and properties of additives	theoretical	**Discussion, Quick Exam, Problem Solving, Homework**
Third	**3**	**Additives**	Types and properties of additives	theoretical	**Discussion, Quick Exam, Problem Solving, Homework**
Fourth	**3**	**Types of concrete**	Different types of concrete	theoretical	**Discussion, Quick Exam, Problem Solving, Homework**
V	**3**	**Types of concrete**	Different types of concrete	theoretical	**Discussion, Quick Exam, Problem Solving, Homework**
Sixth	**3**	**practical**	Explain and conduct some experiments and tests	practical	**Discussion, Quick Exam, Problem Solving, Homework**
Seventh	**3**	**Concrete mixes**	Design of concrete mixes	theoretical	**Discussion, Quick Exam, Problem Solving, Homework**
Eighth	**3**	**Concrete mixes**	Design of concrete mixes	theoretical	**Discussion, Quick Exam, Problem Solving, Homework**
Ninth	**3**	**practical**	Explain and conduct some experiments and tests	practical	**Discussion, Quick Exam, Problem Solving, Homework**
X	**3**	**Soft concrete**	Properties and tests of soft concrete	theoretical	**Discussion, Quick Exam, Problem Solving, Homework**
Eleventh	**3**	**practical**	Explain and conduct some experiments and tests	practical	**Discussion, Quick Exam, Problem Solving, Homework**
Twelfth	**3**	Hard Concrete	Properties and tests of solid concrete	theoretical	**Discussion, Quick Exam, Problem Solving, Homework**

Thirteenth	**3**	**practical**	Explain and conduct some experiments and tests	practical	**Discussion, Quick Exam, Problem Solving, Homework**
Fourteenth	3	Hard Concrete	Properties and tests of solid concrete	theoretical	**Discussion, Quick Exam, Problem Solving, Homework**
Fifteenth	3	Review			
Sixteenth	3	Review			

Human Rights

	2- Building Materials Technology I
Minimum number of students	10
The largest number of students	40

12- Infrastructure:	
Required readings: ▪ Course Books ▪ Other	Concrete technology - Dr. Moayad Nouri Al-Khalaf and Dr. Hanaa Abd Youssef Concrete Technology – Dr. M.S.Shetty Properties of Concrete – A.M.Neville Concrete additives – Dr. Moayad Nouri Khalaf Concrete technology – B.L. Gupta and Amit Gupta
Special requirements	Concrete Laboratory
Social Services (Includes for example guest lectures, vocational training and field studies)	There isn't any

Descr

Defining human rights and then explaining its importance and divisions

Anbar University/ College of Engineering	**Educational institution -١**
Department of Dams and Water Resources Engineering	**University -٢ department/center**
DWE2104	**Course name/code -٣**
Bachelor's	**The programs in which he -٤ participates**
Official working hours	**Available forms of -٥ attendance**
First semester/ first academic year	**Semester/year -٦**
hours ٣٠	**Number of study hours -٧ (total)**
_ ٢٠٢٣/٢٠/٩	**The date this description -٨ was prepared**

: Course objectives -٩

١. e student should be able to recognize the basic principles of uman rights
٢. e student should be able to identify the roots of human rights nd their development in human history
٣. e student should be able to identify human rights in ntemporary and modern history

: **A : No: Cognitive objectives**

.The student learns about the basic principles of human rights -١
The student learns about the roots of human rights and their development in -٢
.human history
. The student learns about human rights in the Middle Ages -٣
.The student learns about human rights in contemporary and modern history -٤
.The student learns about regional recognition of human rights -٥
.The student learns about necessary human rights and collective human rights - ٦

secondly: Skills objectives ofthe : course

.Familiarity with the basic principles of human rights - ١
Familiarity with the roots of human rights and their development in human -٢
. history
.Familiarity with human rights in contemporary and modern history -٣
.B4- Familiarity with necessary human rights and collective human rights

:Third: Emotional and value goals

Creating a spirit of competition between the student and his peers in a way that - ١
.reflects positively on raising the academic level
Developing the scientific and intellectual capabilities of distinguished students - ٢
.and implanting the idea of continuing learning for all
Try as much as possible to find forms of cooperation between the educational -٣
.institution and society

: A- Teaching and learning methods

. The introductory method -١
.Dialogical method -٢
.Test method -٣

: B- Evaluation methods

١- Initial evaluation (by adopting the direct dialogue method).

٢- Continuous evaluation (by conducting a set of exams with multiple options).

٣- Diagnostic evaluation (by conducting scheduled tests at specific times and assigning the coating to perform specialized projects).

٤- Final evaluation.

: C- Thinking skills

١- Knowing and studying how to analyze the forces affecting objects and linking them to reality to direct the student's thought towards practical life.

٢- Analyze the results of solving problems and compare them mentally with reality and the extent of their conformity with the actual design values.

٣- Analyzing the results obtained by the student by conducting practical reports and determining the extent of their reality.

: D- Teaching and learning methods

١- The teacher delivers detailed theoretical lectures.

٢- The teacher requests periodic reports on the basic topics of the subject.

٣- Asking the student to visit the library and the international information network (the Internet) to obtain additional knowledge of the academic subjects.

: E- Evaluation methods

<u>:The evaluation is done on the basis of</u>

١- Monthly exams: 20%

٢- Daily exams: 10%

٣- Duties: 5%

٤- Commitment to working hours + daily participation: 5%

٥- Final exam: 60%

F - General and transferable skills (other skills related to employability and : (personal development

١- Enabling students to write practical reports on topics related to human rights.

٣- Enabling students to self-development.

٣- Developing the student's ability to analyze information and interpret the data he obtained through practical discussion.

٤- Enabling students to overcome potential obstacles between human rights and public freedoms

: Course structure -١١

Evaluation method	Teaching method	Name of the unit/course or subject	Required learning outcomes	hours	the week
Discussion, quick quiz	theoretical	The emergence of the idea of rights in positive legislation	The student understands the lesson	٢	the first
Discussion, quick quiz	theoretical	Law departments	The student understands the lesson	٢	the second
Discussion, secret exam	theoretical	Sections of rights in law	The student understands the lesson	٢	the third
Discussion, quick quiz	theoretical	Sections of rights in the principles of Islamic jurisprudence	The student understands the lesson	٢	the fourth
discussion	theoretical	The rights of the individual over society	The student understands the lesson	٢	Fifth
, discussion Written test	theoretical	Society's rights over the individual	The student understands the lesson	٢	VI
discussion	theoretical	First month exam	The student understands the lesson	٢	Seventh
, discussion Written test	theoretical	Rights of the individual over the individual	The student understands the lesson	٢	VIII

Discussion, quick homework , exam	theoretical	**The right to equality before Sharia and the law**	**The student understands the lesson**	٢	Ninth
, discussion Written test	theoretical	**God's rights are a guarantee of human rights**	**The student understands the lesson**	٢	The tenth
Discussion, quick homework , exam	theoretical	**Spiritual energy**	**The student understands the lesson**	٢	eleventh
, discussion Written test	theoretical	Second month exam	**The student understands the lesson**	٢	twelveth
Data Show General				٢	Thirteenth
Review				٢	fourteenth

: Acceptance -١٣	
	Prerequisites
١٠	The smallest number of students
٤٠	The largest number of students
: Infrastructure -١٢	
Human rights and their guarantees in Islam	Required :readings ▪ Course books ▪ Other
All solid scientific journals that are related to the broad concept of human rights	Special requirements

Websites on the Internet related to human rights	social services Includes, for) example, guest ,lectures professional training, and (field studies

Concrete Technology

Course Description

Concrete technology

It is a science that specializes in the study of the properties of concrete as a structural material, its manufacture and the development of its resistance to withstand the construction loads. The study of concrete technology aims to teach and train the student the basics of this science and the principles of chemical interaction between cement compounds and the effect of additives on the properties of concrete and how to design different types of ordinary or special concrete mixtures as well as the study of the properties and tests of concrete in its wet and hardened states. It also prepares the student to explain the phenomena or problems that occur in the concrete structure.

1- Educational institution	Anbar University / College of Engineering

2- University Department / Center	Department of Dams and Water Resources Engineering
3- Course name/code	Concrete Technology / DWE2309
4- Programs in which it enters	Bachelor
5. Available Forms of Attendance	Official working hours
6- Semester/Year	Second Semester / Second Academic Year
7- Number of study hours (total)	48
8. Date of preparation of this description	2022-2023
9- Course Objectives:	
A-The student understands the science of concrete technology because it is one of the scientific and applied foundations of dam engineering and water resources. B - It has an important role in increasing the student's intellectual perceptions to deal with engineering problems and achieve solutions to these problems. C- Its basic and prominent role in building the design of buildings and facilities related to irrigation engineering and dams.	

10- Learning outcomes and methods of teaching, learning and evaluation:

First: Cognitive Objectives:

1- Identify the basic compositions of concrete from cement and its types and aggregates.
2- Expanding students' perceptions and enhancing the concept of concrete technology by giving them general principles and concepts about the properties, components and types of concrete mixtures.
3- Giving the student experience in studying the effect and types of concrete additives and their properties.
4- Learn how to design concrete mixtures and calculate their quantities.
5- Learn about the properties of soft concrete and its tests.
6- Identify the properties of hardened concrete and its tests

Second: Objectives and skills of the course:

1 - A detailed study of the science of concrete technology.
2 Study the properties and components of concrete.
3 - Teaching the student after the end of the semester the effect of the quality of concrete in bearing the structural forces.
4- Preparing an engineer to be a successful engineer by learning the correct principles of his specialization.

A- Teaching and learning methods:

1- Providing students with the basics and topics related to the previous learning outcomes of skills to solve practical problems through speech, lecture or experiments.
2- Solving a set of practical and applied examples by the subject teacher.
3- Through discussion, students are involved by solving some practical problems.
4- Sudden daily and weekly continuous tests.
5- Attending in private laboratories and conducting scheduled tests and experiments.
6- Guiding students to some electronic reality to benefit from them.

B- Evaluation Methods:

1- Evaluating students individually by giving an opportunity for classroom participation by answering questions.

2- Evaluating students collectively through daily exams with practical and theoretical questions.

3- Evaluating students collectively by giving extracurricular duties such as writing reports or solving assignments.

4- Permanent monthly exams for students to evaluate their overall performance and understanding of the material.

5- Final exams for the first and second rounds.

C- Thinking skills:

1- Knowing and studying how to analyze the forces acting on objects and linking them to reality to direct the student's thought towards practical life.

2- Analyzing the results of solving problems and comparing them with reality mentally and the extent to which they match the actual design values.

3- Analyzing the results obtained by the student by conducting practical reports and reaching the extent of their truth.

D- Teaching and learning methods:

1- Using modern means in presenting the scientific and theoretical side, such as Data Show devices, to attract attention and attract students to better reach the idea to the student.

2- Giving students extracurricular duties that require them to exert skills and self-explanations in experimental ways.

3- Interrogate students through panel discussions by asking intellectual questions such as: (how, why, when, where, any) for specific topics.

4- Using the method of brainstorming and mental nutrition in order to activate the accumulated experiences of students by linking what has been taken from the subjects taken in the pre-university stages and linking them to the new.

5- Providing students with practical skills by linking their studies to practical reality.

E- Evaluation Methods:

The evaluation is carried out on the basis of:

1- Monthly exams: 20%

2- Daily exams: 10%

3- Duties: 5%

4- Commitment to permanence and daily participation: 5%

5- Participation and practical exams: 10%

6- Final exam: 50 %

F- General and transferred skills (other skills related to employability and personal development):

1- Enabling students of concrete technology in its applied and cognitive aspects.

2- Developing the student's ability to analyze the information and interpret the data obtained by linking the subject he learned with practical reality.

3- Enabling the student to use special and general equations to design concrete mixtures and how to benefit from them in analyzing problems and extracting results accurately.

4- Enabling the student to conduct a field examination to determine the liquid pain that falls on the shoulders of the engineer in the field.

11. Course Structure:

The week	Hours	Required Learning Outcomes	Name of the unit/course or topic	Method of education	Evaluation method
The first	**3**	**Introduction**	General Introduction to Concrete	theoretical	**Discussion, Quick Exam, Problem Solving, Homework**
Second	**3**	**Additives**	Types and properties of additives	theoretical	**Discussion, Quick Exam, Problem Solving, Homework**
Third	**3**	**Additives**	Types and properties of additives	theoretical	**Discussion, Quick Exam, Problem Solving, Homework**
Fourth	**3**	**Types of concrete**	Different types of concrete	theoretical	**Discussion, Quick Exam, Problem Solving, Homework**
V	**3**	**Types of concrete**	Different types of concrete	theoretical	**Discussion, Quick Exam, Problem Solving, Homework**
Sixth	**3**	**practical**	Explain and conduct some experiments and tests	practical	**Discussion, Quick Exam, Problem Solving, Homework**
Seventh	**3**	**Concrete mixes**	Design of concrete mixes	theoretical	**Discussion, Quick Exam, Problem Solving, Homework**
Eighth	**3**	**Concrete mixes**	Design of concrete mixes	theoretical	**Discussion, Quick Exam, Problem Solving, Homework**
Ninth	**3**	**practical**	Explain and conduct some experiments and tests	practical	**Discussion, Quick Exam, Problem Solving, Homework**
X	**3**	**Soft concrete**	Properties and tests of soft concrete	theoretical	**Discussion, Quick Exam, Problem Solving, Homework**

Eleventh	**3**	**practical**	Explain and conduct some experiments and tests	practical	**Discussion, Quick Exam, Problem Solving, Homework**
Twelfth	**3**	Hard Concrete	Properties and tests of solid concrete	theoretical	**Discussion, Quick Exam, Problem Solving, Homework**
Thirteenth	**3**	**practical**	Explain and conduct some experiments and tests	practical	**Discussion, Quick Exam, Problem Solving, Homework**
Fourteenth	3	Hard Concrete	Properties and tests of solid concrete	theoretical	**Discussion, Quick Exam, Problem Solving, Homework**
Fifteenth	3	Review			
Sixteenth	3	Review			

Fluid Mechanics

Course Description Form

12- Infrastructure:	
Required readings: ▪ Course Books ▪ Other	Concrete technology - Dr. Moayad Nouri Al-Khalaf and Dr. Hanaa Abd Youssef Concrete Technology – Dr. M.S.Shetty Properties of Concrete – A.M.Neville Concrete additives – Dr. Moayad Nouri Khalaf Concrete technology – B.L. Gupta and Amit Gupta
Special requirements	Concrete Laboratory
Social Services (Includes for example guest lectures, vocational training and field studies)	There isn't any

Fluid Mechanics

Fundamental concepts. Properties of fluids. Fluid Statics. Momentum and energy equations, applications. Bernoulli equation, applications. Dimensional analysis and similitude. Introduction to viscous flows. Internal flows, laminar and turbulent flows. Head loss and friction factor. Flow over immersed bodies (external flow).

Course Description

1- Educational institution	Anbar University / College of Engineering
2- University Department / Center	Department of Dams and Water Resources Engineering
3- Course name/code	DWE2305
4- Programs in which it enters	Bachelor
5. Available Forms of Attendance	Official working hours
6- Semester/Year	First Semester / Second Academic Year
7- Number of study hours (total)	80
8. Date of preparation of this description	28/1/2022

9- Course Objectives:

Upon completion of this course, students will be able to:

1 The students should be able to define and describe the following basic properties of fluid such as relative density or specific density, viscosity, surface tension, atmospheric pressure as well as Newtonion and Non-Newtonion fluids.

2. The students will be able to describe and define the hydrostatic forces on submerged surface, and calculate it.

3. The student will be able to identify the laminar and turbulent flow .

4. The students should demonstrate an understanding of the following concepts relating to fluid in motion: Quntiuity equation, Bernolli equation, Momentume concept

5. The student will be able to apply the fundemental concepts to problems of flow in pipes.

6. The student will be able to determine the losses of flow in pipes.

7. The students will learn the differences and similarities between pipe flow systems like, pipes in series, pipe in parallel and brach pipes and how to solve these problems.

10- Learning outcomes and methods of teaching, learning and assessment:

First: Cognitive Objectives:

1 Use rectangular, normal-tangential, and polar coordinate systems to describe the motion (kinematics) of a
particle, system of particles, and rigid bodies.
2 Use Newton's Second Law, Work-Energy, and Impulse-Momentum principles to determine the kinetics of
particles, systems of particles, and rigid bodies.
3 Understand and solve introductory vibration problems.
4 In applying the above principles, continue to develop a systematic, orderly procedure for solving
engineering problems and design mechanical device using their knowledge in Dynamics.

Second: Course Skills Objectives:

1 - A detailed study of the mechanics of fluid science.
2- Studying the mathematical details that the student needs during his study of the subject.
3- Preparing an engineer to be a successful engineer by learning the correct principles of his specialization.

A- Teaching and learning methods:

1- Providing students with the basics and topics related to the previous learning outcomes of skills to solve practical problems through speech, lecture or experiments.
2- Solving a set of practical and applied examples by the subject teacher.
3- Through discussion, students are involved by solving some practical problems.
4- Sudden daily and weekly continuous tests.
5- Guiding students to some websites to benefit from them.

B- Evaluation Methods:

1- Evaluating students individually by giving an opportunity for classroom participation by answering questions.

2- Evaluating students collectively through daily exams with practical and theoretical questions.
3- Evaluating students collectively by giving extracurricular duties such as writing reports or solving assignments.
4- Permanent monthly exams for students to evaluate their overall performance and understanding of the material.
5- Final exams for the first and second rounds.

C- Thinking skills:

1- Knowing and studying how to analyze the factors affecting the flow and turn them into principles of design and link them to reality to direct the student's thought towards practical life.
2- Analyzing the results of solving problems and comparing them with reality mentally and the extent to which they match the actual design values.
3- Analyzing the results obtained by the student by conducting practical reports and reaching the extent of their truth.

D- Teaching and learning methods:

1- Using modern means in presenting the scientific and theoretical side, such as Data Show devices, to attract attention and attract students to better reach the idea to the student.
2- Giving students extracurricular duties that require them to exert skills and self-explanations in experimental ways.
3- Interrogate students through panel discussions by asking intellectual questions such as: (how, why, when, where, any) for specific topics.
4- Using the method of brainstorming and mental nutrition in order to activate the accumulated experiences of students by linking what has been taken from the subjects taken in the pre-university stages and linking them to the new.
5- Providing students with practical skills by linking their studies to practical reality.

E- Evaluation Methods:

The evaluation is carried out on the basis of:
1- Monthly exams: 20%
2- Daily exams: 10%
3- Duties: 5%
4- Commitment to permanence + daily participation: 5%
5 - Laboratory (practical side): 10%
6- Final exam: 50%

General and transferable skills (other skills related to employability and personal development):

1- Enabling students to study the material in its applied and cognitive aspects.
2- Developing the student's ability to analyze the information and interpret the data obtained by linking the subject he learned with practical reality.
3- Enabling the student to use the special and general equations of the subject and how to benefit from them in analyzing problems and extracting results accurately.
4- Enabling the student to conduct a field survey to identify the problems that fall on the shoulders of the engineer in the field.

11. Course Structure:					
The week	**Hours**	**Required Learning Outcomes**	**Name of the unit/course or topic**	**Method of education**	**Evaluation metho**
The first	**5**	**General definition of the subject**	*Introduction, Properties of fluids*	theoretical	**Discussion, Quick Exam, Problem Solvi Homework**
Second	**5**	**Liquids in equilibrium**	*Fluid in static pressure* Lab 1 Fluid Properties Lab 2 Fluid Statics	theoretical	**Discussion, Quick Exam, Problem Solvi Homework**
Third	**5**	**Calculating forces on submerged surfaces of all kinds**	*Hydrostatic force on submerged surface*	theoretical	**Discussion, Quick Exam, Problem Solvi Homework**
Fourth	**5**	**Introduction to calculating energy for flow and defining Bernoulli's equation**	**Quiz with resolve problems and discussion** Lab 3 Bernoulli Equation	theoretical	**Discussion, Quick Exam, Problem Solvi Homework**
V	**5**	**Introduction to Momentum Equation with Applications**	*Liquid in motion Rate of change of momentum,*	theoretical	**Discussion, Quick Exam, Problem Solvi Homework**
Sixth	**5**	Drawing of power line and hydraulic line	*Energy and hydraulic grade lines*	theoretical	**Discussion, Quick Exam, Problem Solvi Homework**
Seventh	**5**	Definition of closed flow	Lab 4 Velocity Profiles, *Pipes flow*	theoretical	**Discussion, Quick Exam, Problem Solvi Homework**
Eighth	**5**	**Calculation of losses in flow and definition of their types**	**Quiz + resolve problems,** *Losses in flow of fluid*	theoretical	**Discussion, Quick Exam, Problem Solvi Homework**
Ninth	**5**	**Practical examples on the topic**	Lab 5 Bernoulli Equation (losses in flow), *Friction factor in pipes*	theoretical	**Discussion, Quick Exam, Problem Solvi Homework**
X	**5**	**Pipeline flow issues, taking into account possible cases**	- *Simple pipe problems*	theoretical	**Discussion, Quick Exam, Problem Solvi Homework**

Eleventh	5	**Definition of types of connection in pipes**	*Pipes in series and in parallel*, Lab 6 Sluice Gate	theoretical	**Discussion, Quick Exam, Problem Solvi Homework**
Twelfth	5	**Practical examples on the topic**	- Quiz + resolve problems Lab 8 Weir Flow	theoretical	**Discussion, Quick Exam, Problem Solvi Homework**
Thirteenth	5	Definition of Euler's Energy Equation	Energy equation	theoretical	**Discussion, Quick Exam, Problem Solvi Homework**
Fourteenth	5	define and use the Lycee equation for channel design	Conservation of Momentum	theoretical	**Discussion, Quick Exam, Problem Solvi Homework**
Fifteenth	5	Examples and review	- Quiz + resolve questions, **Rivew**	theoretical	**Discussion, Quick Exam, Problem Solvi Homework**
Sixteenth	5	**1st Course Exam**			

12- Infrastructure:	
Required readings: Course Books Other	**Search in Internet subject related to course topics** (http//www fluid mechanics, pipes, Fluid Statics etc...)
special requirements	There isn't any
Social services (e.g. guest lectures, vocational training and field studies)	There isn't any

13- Acceptance:	
Prerequisites	Principles of Engineering Mechanics and Physics
Minimum number of students	10
The largest number of students	40

13- Acceptance:	
Prerequisites	1- Chemistry I 2- Building Materials Technology I
Minimum number of students	10
The largest number of students	40

Engineering Surveying 1

Course description form

Reviewing the performance of higher education institutions (academic program review((

This course description provides a summary of the most important characteristics of the course and the learning outcomes that the student is expected to achieve, demonstrating whether he or she has made the most of the learning opportunities available. It must be linked to the program description.

Anbar University	1. Educational institution
Dam and water resources engineering	2. University department/center
DWE2308 Engineering Surveying 1	3. Course name/code
Engineering	4. The programs he participates in
electronic	5. Available forms of attendance
(theoretical)	6. Semester/year
First semester 2021-2022	7. Number of study hours (total)

80 hours distributed as follows: 5 hours per week	8. Date this description was prepared
1. Show the student the necessity of redundant information and methods for determining and evaluating errors.	
2. Understand the principles of leveling, measure vertical distances and apply the skills of leveling.	
3. Understand the principle of angles measurements and determine the directions.	
4. Develop, test and calibrate of sensors, instruments and systems for the surveying purposes.	
5. Define the importance of traverse computation in omitted measurement and compute area of plots by using different types of area computation techniques.	

9 .Learning outcomes and methods of teaching, learning and evaluation

A. Teaching and learning methods

١. Lectures

Theoretical + applied + electronic lectures recorded using Google Classroom with White Board in an interactive manner

B. Evaluation methods

Short exams	١
Homework+practical	٢
Activity + attendance	٣
Monthly exams	٤
Oral exam	٥
final exam	٦

C- Thinking skills

The ability to interact with sources and references
Ability to recognize engineering problems
The ability to correctly evaluate
Ability to make suggestions and solve problems
The ability to conclude and compare

D - General and transferable skills (other skills related to employability and personal development.(

1. *Show the student the necessity of redundant information and methods for determining and evaluating errors.*

2. *Understand the principles of leveling, measure vertical distances and apply the skills of leveling.*
3. *Understand the principle of angles measurements and determine the directions.*
4. *Develop, test and calibrate of sensors, instruments and systems for the surveying purposes.*
5. *Define the importance of traverse computation in omitted measurement and compute area of plots by using different types of area computation techniques.*

10. Course structure

Evaluation method	Teaching method	Name of the unit/course or subject	Required learning outcomes	Hours	Week
Short exam + assignments + attendance and participation	Lectures + practical	**TAPING MESUREMENTS**		5	١
Short exam + assignments + attendance and participation	Lectures + practical	**LEVELING—THEORY AND METHODS**		5	٢
Short exam + assignments + attendance and participation	Lectures + practical	**LEVELING—THEORY AND METHODS**		5	٣
Short exam + assignments + attendance and participation	Lectures + practical	**LEVELING—THEORY AND METHODS**		5	٤
Short exam + assignments + attendance and participation	Lectures + practical	**LEVELING—THEORY AND METHODS**		5	٥
Short exam + assignments + attendance and participation	Lectures + practical	**DISTANCE MEASUREMENTS USING TACHEOMETRIC OR OPTICAL METHOD**		5	٦
Short exam + assignments + attendance and participation	Lectures + practical	**DISTANCE MEASUREMENTS USING EDM**		5	٧
Short exam + assignments + attendance and participation	Lectures + practical	**ANGLES, AZIMUTH, AND BEARINGS**		5	٨
Short exam + assignments + attendance and participation	Lectures + practical	**ANGLES, AZIMUTH, AND BEARINGS**		5	٩
Short exam + assignments + attendance and participation	Lectures + practical	**TRAVERSING**		5	١٠
Short exam + assignments + attendance and participation	Lectures + practical	**ANGLES, AZIMUTH, AND BEARINGS**		5	١١
Short exam + assignments +	Lectures + practical	**ANGLES, AZIMUTH, AND BEARINGS**		5	١٢

attendance and participation					
Short exam + assignments + attendance and participation	Lectures + practical	**TRAVERSING**		5	١٣
Short exam + assignments + attendance and participation	Lectures + practical	**TRAVERSING**		5	١٤
Short exam + assignments + attendance and participation	Lectures + practical	**TRAVERSING**		5	١٥

11 .Infrastructure

Reference name	Author name	Required readings: ▪ Course books ▪ Other
Elementary Surveying An Introduction to Geomatics	*CHARLES D. GHILANI & PAUL R. WOLF*	
		Special requirements
		Social services (including, for example, guest lectures, vocational training, and field studies(

12.Acceptance

	Prerequisites
	The smallest number of students
	The largest number of students

Engineering Surveying 2

Course description form

Reviewing the performance of higher education institutions (academic program review((

This course description provides a summary of the most important characteristics of the course and the learning outcomes that the student is expected to achieve, demonstrating whether he or she has made the most of the learning opportunities available. It must be linked to the program description.

Anbar University	1. Educational institution
Dam and water resources engineering	2. University department/center
DWE2309 Engineering Surveying II	3. Course name/code
Engineering	4. The programs he participates in
electronic	5. Available forms of attendance
(theoretical)	6. Semester/year
Second semester 2021-2022	7. Number of study hours (total)
80 hours distributed as follows: 5 hours per week	8. Date this description was prepared
1. Compute area by using different types of area computation techniques.	
2. Determine volumes of various types of material and determine of quantities of water discharged by streams and rivers, per unit of time.	

3. Lay out different type of horizontal curve in the field with surveying equipment.
4. Determine the position of point using GPS.
5. The acquisition and use of spatial information from aerial and satellite imagery and administration of geographic information systems (GIS) .

9 .Learning outcomes and methods of teaching, learning and evaluation

A. Teaching and learning methods

١. Lectures

Theoretical + applied + electronic lectures recorded using Google Classroom with White Board in an interactive manner

B. Evaluation methods

Short exams	١
Homework+Practical	٢
Activity + attendance	٣
Monthly exams	٤
Oral exam	٥
final exam	٦

C- Thinking skills

The ability to interact with sources and references
Ability to recognize engineering problems
The ability to correctly evaluate
Ability to make suggestions and solve problems
The ability to conclude and compare

D - General and transferable skills (other skills related to employability and personal development.(

1. Compute area by using different types of area computation techniques.
2. Determine volumes of various types of material and determine of quantities of water in reservoir.
3. *Lay out different type of horizontal curve in the field with surveying equipment.*
4. Determine the position of point using GPS.
5. The acquisition and use of spatial information from aerial and satellite imagery and administration of geographic information systems (GIS)
6. Apply different type of surveying equipment in hydrographic surveying.

11. Course structure

Evaluation method	Teaching method	Name of the unit/course or subject	Required learning outcomes	Hours	Week
Short exam + assignments + attendance and participation	Lectures + practical	Areas		5	١
Short exam + assignments + attendance and participation	Lectures + practical	Areas		5	٢
Short exam + assignments + attendance and participation	Lectures + practical	Volumes		5	٣
Short exam + assignments + attendance and participation	Lectures + practical	Volumes		5	٤
Short exam + assignments + attendance and participation	Lectures + practical	Volumes		5	٥
Short exam + assignments + attendance and participation	Lectures + practical	Horizontal curves		5	٦
Short exam + assignments + attendance and participation	Lectures + practical	Horizontal curves.		5	٧
Short exam + assignments + attendance and participation	Lectures + practical	Global Position System (GPS)		5	٨
Short exam + assignments + attendance and participation	Lectures + practical	Global Position System (GPS)		5	٩
Short exam + assignments + attendance and participation	Lectures + practical	Basic principle of remote sensing		5	١٠
Short exam + assignments + attendance and participation	Lectures + practical	Basic principle of remote sensing		5	١١
Short exam + assignments +	Lectures + practical	Introduction to Geographic		5	١٢

attendance and participation		Information System (GIS).			
Short exam + assignments + attendance and participation	Lectures + practical	Introduction to Geographic Information System (GIS).		5	١٣
Short exam + assignments + attendance and participation	Lectures + practical	Hydrographic surveying.		5	١٤
Short exam + assignments + attendance and participation	Lectures + practical	Hydrographic surveying.		5	١٥

11 .Infrastructure

Reference name	Author name
Elementary Surveying An Introduction to Geomatics	*CHARLES D. GHILANI & PAUL R. WOLF*

Required readings:

- Course books
- Other

Special requirements

Social services (including, for example, guest lectures, vocational training, and field studies(

12.Acceptance	
	Prerequisites
	The smallest number of students
	The largest number of students

Calculus III

Course description form

Reviewing the performance of higher education institutions ((academic program review))

This course description provides a summary of the most important characteristics of the course and the learning outcomes that the student is expected to achieve, demonstrating whether he or she has made the most of the learning opportunities available. It must be linked to the program description.

1. Educational Institution	University of Anbar
2. University Department/Center	College of Engineering/Department of Dams and
3. Course name/code	DWE3310/ Calculus III
4. Programs included in	Calculus III
5. Available forms of attendance	
6. Semester/Year	First /2021

7. Number of study hours	60
8. Date this description was prepared	01/2022
9. Course objectives:	
Conducting scientific and applied research to develop techniques in the field of mathematics related to engineering and also to contribute to solving mathematical problems and engineering equations.	
Linking the field of sports to the field of information technology	
Preparing university teachers who possess the educational skills necessary to teach mathematics	
Developing students' scientific attitudes to enable them to develop their own abilities in their higher studies	
Providing students with how to innovate and develop educational methods for use in teaching mathematics	

Learning outcomes and methods of teaching, learning and evaluation ١٤
1. Knowledge and understanding 1. Recognize the 3-space in different types of coordinates systems. 2. Do operations on vectors. 3. Identify different types of equations of lines, planes and surfaces. 4. Recognize different types of calculus operations of vector-valued functions.
B- Subject-specific skills Teaching mathematics to the second stage. Building appropriate education strategies for the second stage. Constructing mathematics tests to evaluate the achievement of second-stage students. Developing self-abilities in developing their abilities by teaching mathematics to teach.
Teaching and learning methods

-Theoretical lecture
–Discussion sessions
-Student theoretical research

Evaluation methods:
١. Homework
٢. Daily Quiz
٣. Scientific reports
٤. Attendance
٥. Interaction in lectures
1. ٦. Final exam

C- Thinking skills

1. Recognize the three space in different types of coordinates systems.
2. Do operations on vectors.
3. Identify different types of equations of lines, planes and surfaces

Teaching and learning methods

–Preparing theoretical scientific reports
Solve applied questions and assignments related to mathematics.

Evaluation methods

–Understanding scientific material and mathematical principles.
-Multiple choice questions.
–Interview questions
–Completion questions.
–Apply knowledge in a simple way to interpret data,

- د General and transferable skills (other skills related to employability and personal development).
The ability to present, discuss, and defend ideas orally, in writing, and electronically

Course Structure					
Evaluation method	**Teaching method**	**Name of the unit/course or subject**	**Required learning outcomes**	**Hours**	**Week**
Daily exams	lecture	Rectangular Coordinate systems in 3-space. Vectors		5	1
Daily exams		Dot product, projections. Cross product		٥	٢
Daily exams		Parametric equations of a line. Planes in 3-space		٥	٣
Daily exams		Introduction to vector-valued functions. Calculus of vector-valued functions		٥	٤
Daily exams		Change of parameters, Arc Length. Unit Tangent, Normal and Binormal vectors		٥	٥
Daily exams		Curvature		٥	٦
Daily exams		Quadric Surfaces. Functions of two or more variables		٥	٧
Daily exams		Limits and continuity. Partial derivatives		٥	٨
Daily exams		Differentiability, Local Linearity. The Chain rule		٥	٩

Daily exams		Directional derivatives and gradients. Tangent planes and normal vectors		٥	١٠
Daily exams		Maxima and minima of functions of two variables.		٥	١١
Daily exams		Double integrals. Double integrals over non rectangular regions		٥	١٢
Daily exams		Double integrals in polar coordinates. Triple integrals		٥	١٣
Daily exams		Cylindrical and spherical coordinates.		٥	١٤
Daily exams		Triple integrals in cylindrical and Spherical coordinates		٥	١٥

Infrastructure .	
Calculus, by H. Anton, I. Bivens, and S. Davis, 8th Edition, 2002, Wiley	Required readings: Course books Other ▪
Daily homework will be due at the beginning of the next class after it is assigned unless otherwise noted in class. All homework assignments should be turned in before class begins. Work turned in late will be penalized in increments of 10% per day. Work will not be accepted beyond two days late without special coordination affected prior to the due date. Students in this course with disability requiring an accommodation should contact the professor as soon as possible or contact the head of the department.	Special requirements
	Social services (including, for example, guest lectures, vocational training, and field studies)

Acceptance .	
	Prerequisites
١٠	The smallest number of students
٢٠	The largest number of students

Calculus 4

Course Description

Calculus 4, builds upon the concepts learned in Calculus 1, 2, and 3. It focuses on the study of functions of several variables and extends the ideas of differentiation and integration from single-variable calculus to multiple variables.
The course typically covers topics such as:
1. Vectors and Geometry: Introduction to vectors, dot product, cross product, lines, planes, and surfaces in three-dimensional space.
2. Partial Differentiation: Computing partial derivatives, tangent planes, gradient vectors, directional derivatives, and optimization problems.
3. Multiple Integration: Double and triple integrals, iterated integrals, changing coordinate systems, and applications including finding areas, volumes, and mass

Anbar University / College of Engineering	1- Educational institution
Department of Dams and Water Resources Engineering	2- University Department / Center
DWE2212	3- Course Name/Code
Bachelor	4- Programs in which he enters
Official working hours	5- Available Attendance Forms
Second Semester / Second Academic Year	6- Semester / Year
٦٤	7- Number of Credit Hours (Total)
/١/٢٨2022	8- The history of preparation of this description
9- Course Objectives:	

To help students to develop skills and knowledge for standard concepts in solving Differential Equations.

9- Learning Outcomes, Teaching, Learning and Assessment Methods:

First: Cognitive Objectives:

1- Identify the basic types of mathematical functions and their derivatives .

2- Expanding students' perceptions and enhancing the concept of mathematical applications by giving them general principles and concepts about the importance of these applications in engineering fields.

Second: Course Skills Objectives:

1 - A detailed study of mathematical equations.

2- Studying the mathematical details that the student needs during his study of the subject.

3- Preparing an engineer to be a successful engineer by learning the correct principles of mathematical applications for his specialization.

A- Teaching and learning methods :

١- Provide students with the basics and topics related to the previous learning outcomes of skills to solve practical problems through delivery, lecture or experiments.

2- Solving a set of practical and applied examples by the subject teacher.

3- Through discussion, students are involved by solving some practical problems.

4- Sudden daily and weekly continuous tests.

5- Guiding students to some websites to benefit from them .

B- Evaluation Methods :

١- Evaluate students individually by giving an opportunity for classroom participation by answering questions.

2- Evaluating students collectively through daily exams with practical and theoretical questions.

3- Evaluating students collectively by giving extracurricular duties such as writing reports or solving assignments.
4- Permanent monthly exams for students to evaluate their overall performance and understanding of the material.
5- Final exams for the first and second rounds.

C- Thinking skills :

١- Knowing and studying how to analyze the factors affecting the flow and turn them into principles of design and link them to reality to direct the student's thought towards practical life.
2- Analyzing the results of solving problems and comparing them with reality mentally and the extent to which they match the actual design values.
3- Analyzing the results obtained by the student by conducting practical reports and reaching the extent of their truth.

D- Teaching and learning methods :

١- Using modern means in presenting the scientific and theoretical side, such as Data Show devices to attract attention and attract students to better reach the idea to the student.
2- Giving students extracurricular duties that require them to exert skills and self-explanations in experimental ways.
3- Interrogate students through panel discussions by asking intellectual questions such as: (how, why, when, where, any) for specific topics.
4- Using the method of brainstorming and mental nutrition in order to activate the accumulated experiences of students by linking what has been taken from the subjects taken in the pre-university stages and linking them to the new.
5- Providing students with practical skills by linking their studies to practical reality.

E- Evaluation Methods :

<u>The evaluation is carried out on the basis of:</u>
1- Monthly exams: 20%
2- Daily exams: 10%
3- Duties: 5%
4- Commitment to permanence + daily participation: 5%
5- Final exam: 60%

F- General and transferred skills (other skills related to employability and personal development):

1- Enabling students to study the material in its applied and cognitive aspects.
2- Developing the student's ability to analyze the information and interpret the data obtained by linking the subject he learned with practical reality.
3- Enabling the student to use the special and general equations of the subject and how to benefit from them in analyzing problems and extracting results accurately.
4- Enabling the student to conduct a field survey to identify the problems that fall on the shoulders of the engineer in the field.

10- STRUCTURE COURSE

ASSESSMENT	LEARNING	OBJECT	REQUIRED OUTCOMES	HOUR	WEEK
		First-Order Differential Equations: Initial-value problem. Separable variables.		٤	First
		Homogeneous equations. Exact equations. Linear equations. Integrating factor.		٤	second
		Bernoulli equation. Applications. Second-Order Differential Equations: Initial-value and Boundary-value problems.		٤	third
		Linear differential operators. Reduction of order. Homogeneous equations with constant coefficients.		٤	fourth
		Non-homogeneous equations. Method of undetermined coefficients. Method of variation of parameters.		٤	fifth
		Some nonlinear equations. Applications. Higher order Differential Equations.		٤	sixth
		Laplace Transforms: Definitions. Properties. Inverse Laplace transforms. Solving initial value problems.		٤	SEVENTH
		Special functions: Heavy side unit step function. Convolution theorem. System of Linear Differential Equations: Definitions. Elimination method.		٤	EIGHTH
		Application of Linear Algebra. Homogeneous linear systems. Non-homogeneous linear systems. Solving systems by Laplace transforms.		٤	NINETN
1st Course Exam					

13- ACCEBTANCE	
Calculus1, calculus2,calculus3	Prerequisites
١٠	Minimum number of students
٤٠	The largest number of students

English Language-١

Course Description Form

Review The Performance of Higher Education Institutions ((Review of The Academic Program))

Study English-1 to help the student write and understand the topics and skills of the engineering field, in addition to developing ideas for how to write research and presentations

Educational Institution	University of Anbar/College of Engineering
University Department/Center	Dams & Water Resources Department
Course Name/Code	English Language-١
Program	Bachelor
Available Attendance Form	Full Time
Semester/Year	First Term/2022-2023
Number of Credit Hours	45
Date of Description Preparation	9/10/2021

Course Objectives:
• It is primary and prominent role in teaching the writing of structural pieces and simple research related to the field of study. • Teach students to use their skills to use the electronic library and scientific research methods. • Develop students' speaking and reading analysis skills in books and research articles.

Learning outcomes and teaching, learning and assessment methods
First: Cognitive Objectives: • Learn about the style of talking to people . • Develop the skill of scientific knowledge of engineering topics. • Develop the skills of using methods to prevent the deprivation of intellectual rights. • Active participation in the classroom and interaction with students. • Learn about ways to use sources for research and scientific books.
Second: Course Skills Objectives : 1- Learn to use numbers and methods of writing them in English. 2 -Encouraging the student's skills to use source writing systems. 3 -Expanding academic vocabulary by writing topics that affect the field of study, which is engineering. 4 -Encouraging students to develop their academic ideas. 5- Develop the student's writing skills
Teaching And Learning Methods
1 -Providing students with the basics and topics related to previous education outcomes through recitation or lecture. 2 -Solving a set of examples by the groups of students and their participation in the solution. 3 -Expanding the discussion of speaking English with the participation of students . 4 -Sudden daily and continuous weekly tests . 5- Guiding students to some websites to benefit from them
Evaluation Methods

1. Evaluate students individually by giving an opportunity for classroom participation by answering questions.
2. Evaluating students collectively through daily exams with various questions that depend on the cognitive aspect of the student.
3. Evaluating students collectively by giving extracurricular duties such as writing simple essays.
4. Permanent monthly exams for students to evaluate their general performance and understanding of the material
5. Final exams for the first and second attempts.

Thinking Skills

1 -Knowing and studying how to use research writing methods and systems and using sources .

2- Encouraging the student to learn about entering electronic libraries

Teaching And Learning Methods

- Using modern means to display the scientific and theoretical side, such as Data Show devices to attract attention and attract students to better reach the idea to the student.
- Give students extracurricular assignments that require them to practice writing skills.
- Interrogate students through panel discussions by asking thinking questions (how, why, when, where, any) for specific topics.
- Linking the cognitive aspect with the student's knowledge reserve to develop speaking and writing skills.

Evaluation Methods

The evaluating according to:

7. Monthly Quizzes 20%
8. Quick Quizzes 10%
9. Assignments 5%
10. Attendance +Participations 5%
11. Final Exams 60%

General and transferable skills (other skills related to employability and personal development).

1 -Enabling students to master English 1 in the aspect of fluent speaking.

2-Developing the student's ability to write simple articles with the possibility of presenting them for discussion with students and teachers

Course Structure

Week	Hours	Required Learning Outcomes	Name of the Unit/Course or Topic	Method of Education	Evaluation Method
1	3	Student understands lesson	• Am/ are/ is, my/ your • How are you? • What's this in English? • Plurals • This is……. • Good morning! • Numbers 1-10	Thermotical lecture	Discussion, quick exam, and home works
2	3	Student understands lesson	• Countries • Where's he from? • Numbers 11-30 • He/ she/ they, his/ her • Fantastic/ awful/ beautiful	Thermotical lecture	Discussion, quick exam, and home works
3	3	Student understands lesson	• Jobs • Am/are/is • Negatives and questions Personal information • Social expressions-1	Thermotical lecture	Discussion, quick exam, and home works
4	3	Student understands lesson	• Our/ their Possessive's • The family • Has/ have • The alphabet	Thermotical lecture	Discussion, quick exam, and home works
5	3	Student understands lesson	• Sports/ food/ drinks • Present simple- I/ you/ we/ they • a/ an Language nationalities • Numbers and prices	Thermotical lecture	Discussion, quick exam, and home works
6	3	Student understands lesson	- The time - Present simple- he/ she - Always/ sometimes/ never - Words that go together - Days of the week	Thermotical lecture	Discussion, quick exam, and home works
7	3	Student understands lesson	- Question words - Me/ him/ us/ them - This/ that - adjectives - Can I ….?	Thermotical lecture	Discussion, quick exam, and home works
8	3	Student understands lesson	- Rooms and furniture - There is/ are - Prepositions - Directions	Thermotical lecture	Discussion, quick exam, and home works
9	3	Student understands lesson	• Saying years • Past simple- irregular verbs • When's your birthday?	Thermotical lecture	Discussion, quick exam, and home works

10	3	Student understands lesson	• As/ were born • Have/ do/ go	Thermotical lecture	Discussion, quick exam, and home works
11	3	Student understands lesson	• Past simple- regular and irregular • Sport and leisure	Thermotical lecture	Discussion, quick exam, and home works
12	3	Student understands lesson	• Questions and negatives • Going sightseeing	Thermotical lecture	Discussion, quick exam, and home works
13	3	Student understands lesson	• Can/ can't • Adjective+ noun	Thermotical lecture	Discussion, quick exam, and home works
14	3	Student understands lesson	• Adverbs • Everyday problems • In a restaurant	Thermotical lecture	Discussion, quick exam, and home works
15	3	Student understands lesson	• I'd like- some/ any • Signs all around	Thermotical lecture	Discussion, quick exam, and home works

Infrastructure	
References	John & Liz Soars, "New Headway intermediate- Student's Book", 10th ed 2014
Special Reequipments	
Social services (e.g. guest lectures, vocational training and field studies)	

Acceptance	
Prerequisites	---
Minimum Students Numbers	40
Maximum Students Number	57

Design of Dams

Module Description Form

Module Information					
Module Title	**Design of Dams**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Tutorial** ☐ **Lab** ☐ **Practical** ☐ **Seminar**	
Module Code	**DWE4302**				
ECTS Credits	**3**				
SWL (hr/sem)	**125**				
Module Level		4	**Semester of Delivery**		1
Administering Department		Type Dept. Code	**College**		Type College Code

Module Leader	Rafid Saadoon Rashid	**e-mail**	
Module Leader's Acad. Title	Professor	**Module Leader's Qualification**	Ph.D.
Co- Module Leader	Dr.Rafid Saadoon Rashid	**e-mail**	Rafid.alboresha@uoanbar.edu.iq
Peer Reviewer Name	Name	**e-mail**	E-mail
Scientific Committee Approval Date	01/11/2021	**Version Number**	1.0

Relation with other Modules

Prerequisite modules	Fluid mechanics (DWE2304), Open Chanel (DWE2305), Engineering Hydrology (DWE3304) and Hydraulic Structures (DWE3306)

Module Aims, Learning Outcomes and Indicative Contents

Module Objectives	The goals of this course are to enable students to: 1. To impart the principles of analysis, design, and behavior of dam and hydraulic structures belong to it. 2. To enable the student how to choose the suitable type of dams and how to select the perfect site to construct the dam. 3. Familiarity with professional and contemporary issues.
Module Learning Outcomes	By the end of successful completion of this course, the student will be able to: 1. The basics and consideration of dam design. 2. Understanding of the principles of hydrology for design. 3. Gain tools for planning, analysis and design for different types of dams, 4. Planning, analysis and design for spillways, .
Indicative Contents	

Learning and Teaching Strategies

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

	considering types of simple experiments involving some sampling activities that are interesting to the students.

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	**Introduction: Important Terms for The main Parts of Dam, Planning Consideration, Classification of Dams and Factors Governing Selection Site of Dams.-**
Week 2	**Flood Hydrology for Design Purposes**
Week 3	**Estimation of design flood**
Week 4	**Gravity Dams - I**
Week 5	**Gravity Dams - II**
Week 6	Exam1
Week 7	**Concrete Arch Dams - I**
Week 8	**Concrete Arch Dams - II**
Week 9	**Buttress Dams**
Week 10	Exam 2
Week 11	**Earth Dams - I**
Week 12	**Earth Dams – II**
Week 13	**Rock fill**
Week 14	Exam3
Week 15	**Preparatory week before the final Exam**

Learning and Teaching Resources

	Text Available in the Library?
Required Texts	**Hydraulic Structures,** P. Novak, A.I.B. Moffat and C. Nalluri School of Civil Engineering and Geosciences, University of Newcastle upon Tyne, UK And R. Narayanan Formerly Department of Civil and Structural Engineering, UMIST, University of Manchester, UK Fourth edition published 2007 by Taylor & Francis Yes
Recommended Texts	
Websites	

Grading Scheme

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

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

Environmental Engineering

Course description form

Reviewing the performance of higher education institutions (academic program review((

This course description provides a summary of the most important characteristics of the course and the learning outcomes that the student is expected to achieve, demonstrating whether he or she has made the most of the learning opportunities available. It must be linked to the program description.

Anbar University	1. Educational institution
Dam and water resources engineering	2. University department/center
DWE3308 Environmental Engineering	3. Course name/code
Engineering	4. The programs he participates in
electronic	5. Available forms of attendance
(theoretical)	6. Semester/year
Second semester 2021-2022	7. Number of study hours (total)
45 hours distributed as follows: 3 hours per week	8. Date this description was prepared
Course objectives: **1.Identify the quantity, quality, types and characterization of wastewater generated** **2.To understand the properties and the design criteria of the conventional wastewater treatment plant (WWTP).** **3. To learn the objectives and methods of sewage treatment and to study the features and function of different primary treatment units.** **4. To study the features and function of different secondary treatment units.** **5. To learn the objectives and methods of sewage disposal.** **6. To learn the objectives and methods of sludge treatment.**	

9 .Learning outcomes and methods of teaching, learning and evaluation

A. Teaching and learning methods

١. Lectures
Theoretical + applied + electronic lectures recorded using Google Classroom with White Board in an interactive manner

B. Evaluation methods

Short exams	١
Homework	٢
Activity + attendance	٣
Monthly exams	٤
Oral exam	٥
final exam	٦

C- Thinking skills

The ability to interact with sources and references
Ability to recognize engineering problems
The ability to correctly evaluate
Ability to make suggestions and solve problems
The ability to conclude and compare

D - General and transferable skills (other skills related to employability and personal development.(

١. Ability to deal with work environment problems
٢. Correct investigation of problems and the ability to find solutions to them
٣. Evaluate, use, and improve work mechanisms
٤. Determine appropriate work standards
5 .Developing the spirit of cooperation and teamwork as one team

12. Course structure

Evaluation method	Teaching method	Name of the unit/course or subject	Required learning outcomes	Hours	Week
Short exam + assignments + attendance and participation	Lectures	Wastewater treatment objective		3	١
Short exam + assignments + attendance and participation	Lectures	Sanitary sewage flow estimation		3	٢
Short exam + assignments + attendance and participation	Lectures	Characteristics and composition of sewage		3	٣
Short exam + assignments + attendance and participation	Lectures	Sewerage system		3	٤
Short exam + assignments + attendance and participation	Lectures	Types and method of wastewater treatment		3	٥
Short exam + assignments + attendance and participation	Lectures	Primary treatment		3	٦
Short exam + assignments + attendance and participation	Lectures	Screens		3	٧
Short exam + assignments + attendance and participation	Lectures	Grit chamber		3	٨
Short exam + assignments + attendance and participation	Lectures	Primary sedimentation tanks		3	٩
Short exam + assignments + attendance and participation	Lectures	Secondary Treatment of Sewage		3	١٠
Short exam + assignments + attendance and participation	Lectures	Biological treatment (activated sludge)		3	١١
Short exam + assignments + attendance and participation	Lectures	Biological treatment (activated sludge)		3	١٢
Short exam + assignments +	Lectures	Trickling filter		3	١٣

attendance and participation					
Short exam + assignments + attendance and participation	Lectures	Sludge treatment		3	١٤
Short exam + assignments + attendance and participation	Lectures	Advanced treatment		3	١٥

11 .Infrastructure

Reference name	Author name
WATER SUPPLY AND SEWERAGE , , FIFTH Edition	E.W.STEEL & TERENCE J .MCGHEE

Required readings:

- Course books
- Other

Special requirements

Social services (including, for example, guest lectures, vocational training, and field studies(

12.Acceptance

	Prerequisites
	The smallest number of students
	The largest number of students

Engineering Management

Course Discription

One of the important academic subjects for engineering students of all specializations. The study of this subject aims to teach the student the basic principles of planning in construction projects, as studying the main project management skills, project scheduling, critical path, durations, and engineering logic for implementing project sections, in addition to resource management, cost calculations, and contract details. Typical construction projects and referral methods.
The student then can learn about project planning, focusing on legal aspects, cash flows, Direct and indirect costs, agreements, cost control, and linear programming as appropriate in civil engineering projects.

1. Educational institution	**Anbar University/College of Engineering**
2. University department/center	**Department of Dams and Water Resources Engineering**
3. Course name/code	**Engineering Management/DWE3319**
4. Programs in which it is included	**Bachelor's degree**
5. Available forms of attendance	**Official working hours**
6. Semester/year	**First semester/ 2021-2022**
7. Number of study hours (total)	**45**
8. The date this description was prepared	**22 September 2022**

9. Course objectives:

a. **Knowledge and understanding of the concepts of engineering management and construction project management.**
b. **Introducing the types of construction projects and the different project stages from the initial studies stage until operation and maintenance, highlighting the various parties involved in the project and the functions and responsibilities of each of these parties.**
c. **Learn and understand the methods of planning and scheduling projects by studying and analyzing the path of design, implementation, resource planning, allocation and control through the various stages that the project passes through.**
d. **Providing an overview of techniques for improving methods of managing and implementing construction projects.**

10. Learning outcomes, teaching, learning and assessment methods:

First: Knowledge and understanding:

1. The student knows engineering management and its importance in the labor market.
2. The student determines the division of basic tasks and functions at the work site.
3. The student knows the role of the project manager and what other basic roles he performs at the work site, noting the importance of acquiring skills and practical experience.
4. That the student understands the nature of the relationship and interrelationship between the different specializations in engineering work and their practical role, and that the student understands the roles of participants in engineering work.

Second: Course-specific skills:

1. Developing the student's particular engineering and construction management skills and preparing him scientifically to be a site engineer and a successful project manager.
2. Developing the skills of planning, organizing, directing and controlling as they are the basics of good engineering management.
3. Developing the student's skill of making appropriate decisions and time management as it is the essence of engineering work management.

a.Teaching and learning methods:

1. Explaining and clarifying the basics in engineering and construction management in particular and topics related to educational outcomes through delivery, lecture and discussion.
2. Solving a group of applied examples by the subject teacher, with students participating by solving some examples and applied questions.
3. Continuous daily and weekly surprise tests and directing the student to prepare reports on construction management vocabulary and the sequence of logical work paragraphs to expand his understanding of the subject.
4. Directing students to some websites to benefit from them.

b.Evaluation methods:

1- Evaluating students individually by giving them an opportunity to participate in the class by answering questions.
2- Evaluating students collectively through daily exams with questions related to the daily and previous subjects.
3- Evaluating students collectively by giving extracurricular assignments, such as writing reports or doing assignments.
4- Monthly exams during the semester for students to evaluate their general performance and understanding of the subject.
5- Final exams for the first and second round.

c.Third: Thinking skills:

1. Critical thinking (question and answer).
2. Interaction skill
3. Approximate practical examples and try to determine the extent of their compatibility with the situations that the engineer may encounter during the work.

d.Teaching and learning methods:

1. Use ordinary means, such as the blackboard, and modern means, such as Data Show devices, to present lectures to attract attention and attract students so that the idea is better conveyed to the student.
2. Interrogating students through discussion sessions by asking intellectual questions.

3. Using the method of linking the subjects taken in the previous academic stages, while giving examples related to the practice of their specialization to provide them with practical skills to benefit from them in the future.
e.Evaluation methods:
The evaluation is done on the basis of: 1- Monthly exams: 20% 2- Daily exams: 10% 3- Duties: 5% 4- Commitment to working hours + daily participation: 5% 5- Final exam: 60%
f.General and transferable skills (other skills related to employability and personal development): 1- Engineering work management skill. 2- The skill of linking scientific planning with practical. 3- The skill of learning to use accumulated experiences in decision-making.

11. Infrastructure :

. Required readings: Course books Other	Daniel,W.HalpinPurdue,University,Bolivar A. Senior Colorado State University, Construction Management, John Wiley & Sons, Inc. 4th ed., 2011 Clifford J. Schexnayder, Richard E. Mayo, Construction Management,undamentals, McGraw-Hill, 2nd ed., 2008
Special requirements Social services (including, for example, guest lectures, vocational training, and field studies(	Non
Social services (including, for example, guest lectures, vocational training, and field studies)	Scientific trips to project sites

12. Course structure:

Evaluation method	Teaching method	outcomes Name of unit/course or subject	Required learning	Hours	Week
Discussion, problem solving, homework	Theoretical	Construction Technology and Construction	Building technology and construction	3	First.
Discussion, quick exam, problem solving	Theoretical	Construction Industry	Construction industry	٣	Second.
Discussion, homework	Theoretical	Construction planning and scheduling	Methods of planning construction projects	٣	Third.
Discussion, quick quiz	Theoretical	Gantt chart and Activity Precedence Diagrams	Gantt chart	٣	Fourth.
Discuss, solve problems	Theoretical	Program evaluation & review technique	PERT method	٣	Fifth.
discussion	Theoretical	Progress reporting	Work progress reports	٣	Sixth.
	Theoretical	Monthly exam	Monthly exam	٣	Seventh.
Discussing problem solving, homework	Theoretical	Line of Balance Applied to Construction	Balance line method	٣	Eighth.
Discussion, quick exam, problem solving	Theoretical	Work Breakdown Structure	Business distribution structure	٣	Ninth.
Discuss your homework	Theoretical	Earned Value Method	Earned value method	٣	Tenth.
Discussion, quick quiz	Theoretical	Major Construction Contract Types	Main types of construction contracts	٣	Eleventh.
Discussion, quick quiz	Theoretical	Project Delivery Methods	Project delivery methods	٣	Twelfth.
Discuss, solve problems	Theoretical	Project Cost Control Systems.	Project cost control systems	٣	Thirteent
discussion ,	Theoretical	Value Engineering	Value Engineering	٣	Fourteen
Discuss, solve problems	Theoretical	Resource Planning& Allocation, Value Engineering Optimization techniques	Resource planning and allocation	٣	Fifteenth.
1st Course Exam				٣	Sixteenth

13. Acceptance:

Prerequisites	Engineering Statistics, Computer Science
The smallest number of students	١٠
The largest number of students	٤٠

((Engineering Optimization))

Course description

Engineering optimization

- Planning and management issues; institutional objectives and constraints; identifying and evaluating design and management alternatives; role of modeling and its advantages and limitations.
- Optimization Modeling: Examples illustrating various types of models, solution methods and applications to water resources infrastructure planning and management.
- Stochastic Optimization Methods applied to hydrologic and water resource systems.
- Methods for Multiple-purpose River Basin Planning.

1. Educational institution	**Anbar University/ College of Engineering**
2. University department/center	**Department of Dams and Water Resources Engineering**
3. Course name/code	**Engineering Optimization / DWE4307**
4. The programs in which he participates	**Bachelor's**
5. Available forms of attendance	**Official working hours**
6. Semester/year	**First semester/ fourth academic year**
7. Number of study hours (total)	**٦٠**
8. The date this description was prepared	**٢٠٢١-٩-٢٥**
9. Course objectives	
A- The student understands the science of optimization Because he one Scientific and applied foundations For dam and water resources engineering. B- It has an important role in increasing the student's intellectual awareness of dealing with engineering problems and achieving solutions for this problems.	

C- Its basic and prominent role in the design of buildings and facilities is related to irrigation and damengineering.

10. Learning outcomes and methods of teaching, learning and evaluation

First : Cognitive objectives

- This course will provide the student an introduction to the planning, design, and operation of water resources systems using mathematical optimization methods and models. The student will learn to apply basic economic analysis and operations research techniques (linear programming, and combinational optimization) and will apply them to the various surface and groundwater resource allocation problems.
- Be able to develop and solve various types of optimization models of water resources planning and management problems.
- Understand the advantages and limitations of various types of modeling methods and algorithms.
- Understand and appreciate how models have been and can be used in planning and management decision-making processes.
- Understand and critically evaluate literature in water resources systems engineering.

Second: Skills objectives of the course

1. A detailed study of the science of geometric optimization.
2. Teach the student after the end of the semester the effect of engineering optimization in making engineering decisions
3. Engineering preparation to be a successful engineer by learning the correct principles of hisspecialty.

A- Teaching and learning methods

1- Providing students with the basics and topics related to previous educational ,outcomes and the skills to solve practical problems through speech, lecture .or presentations
2- .Solving a group of practical and applied examples by the subject teacher
3- Through discussion, students participate in solving some practical .problems.
4- .Daily surprise and continuous weekly tests
5- Directing students to some websites to benefit from them.

: B- Evaluation methods

١- Evaluating students individually by giving them an opportunity to participate .in the class by answering questions

٢- Evaluating students collectively through daily exams with practical and .theoretical questions

٣- Evaluating students collectively by giving extracurricular assignments, such .as writing reports or doing assignments

٤- Permanent monthly exams for students to evaluate their general performance .and understanding of the subject

٥- .Final exams for the first and second round

C- Thinking skills:

1- Knowing and studying how to analyze the forces affecting objects and linking them to reality to direct the student's thought towards practical life.
2- Analyze the results of solving problems and compare them mentally with reality and the extent of their conformity with the actual design values.
3- Analyzing the results obtained by the student by conducting practical reports and determining the extent of their reality.

D- Teaching and learning methods:

1- Using modern means to present the scientific and theoretical aspect, such asData Show devices to attract attention and attract students so that the , idea reaches the student better.

2- Giving students extra-curricular assignments that require them to exert .skills and self-explanations in experimental ways

3- Interrogating students through discussion sessions by asking intellectual questions such as: (how, why, when, where, which) for specific topics.

4- Using the method of brainstorming and mental nutrition in order to activate the accumulated experiences of students by linking the subjects taken in the pre-university educational levels and linking them to the new ones.

5- Providing students with practical skills by linking their studies to practical reality.

E- Evaluation methods:

The evaluation is done on the basis of:

1- Monthly exams: 20%

2- Daily exams: 10%

3- Project: 10%

4- Final exam: 60%

F - General and transferable skills (other skills related to employability and personal development):

1- Enabling students to study engineering optimization in its applied and cognitive aspects.
2- Developing the student's ability to analyze information and interpret the .data he obtained by linking the subject he learned with practical reality
3- Enabling the student to use special and general equations and how to .benefit from them in analyzing problems and extracting results accurately
4- Enabling the student to conduct a field survey to identify the problems .facing the engineer in the field

: Course structure -١١

the week	hours	Required learning outcomes	Name of the unit/course or subject	Teaching method	Evaluation metho
First	٣	Cognitive objectives	Introduction	theoretical	Discussion, quick exar problem solving, homew
Second	٣	Cognitive objectives	Modeling with Linear Programming	theoretical	Discussion, quick exar problem solving, homew
Third	٣	Course-specific skills objectives	Tutorials	theoretical	Discussion, quick exar problem solving, homew
Fourth	٣	Cognitive objectives	Graphical method	theoretical	Discussion, quick exar problem solving, homew
Fifth	٣	Course-specific skills objectives	Tutorials	theoretical	Discussion, quick exam problem solving, homewo
VI	٣	Cognitive objectives	The Simplex Method	theoretical	Discussion, quick exam problem solving, homewo
Seventh	٣	Cognitive objectives	Two-phase method	theoretical	Discussion, quick exam problem solving, homewo
VIII	٣	Course-specific skills objectives	Tutorials	theoretical	Discussion, quick exam problem solving, homewo
Ninth	٣	Cognitive objectives	The Dual Simplex Method	theoretical	Discussion, quick exam problem solving, homewo
The tenth	٣	Course-specific skills objectives	Tutorials	theoretical	Discussion, quick exam problem solving, homewo
eleventh	٣	Course-specific skills objectives	Quiz	theoretical	Discussion, quick exam problem solving, homewo
twelveth	٣	Course-specific skills objectives	Tutorials	theoretical	Discussion, quick exam problem solving, homewo

Thirteenth	۳	Cognitive objectives	Big-M method	theoretical	, discussion, quick exa Problem solving, homew
fourteenth	۳	Cognitive objectives	Duality and Sensitivity Analysis	theoretical	, discussion, quick exa Problem solving, homew
Fifteenth	۳	Cognitive objectives	THE REVISED SIMPLEX METHOD	theoretical	, discussion, quick exa Problem solving, homew
sixteen	۳	Review			

: Infrastructure -۱۲	
:Required readings ▪ Course books ▪ Other	- *Loucks DP and Beek EV (2005) Water Resources Systems Planning and Management. UNESCO* - *Karmouz M., Szidarovszky F., and Zahraie B. (2003) "Water Resources System Analysis", CRC Press* - *Vedula S., and Mujumdar P. P. "Water Resources Systems", McGraw Hill*
Special requirements	nothing
Social services (including, for ,example, guest lectures vocational training, and field (studies	nothing

: Acceptance -۱۳	
Prerequisites	-۱Engineering Statistics -۲Engineering Numerical Methods
The smallest number of students	۱۰
The largest number of students	٤۰

((Engineering Optimization))

Course description

Engineering optimization

- Planning and management issues; institutional objectives and constraints; identifying and evaluating design and management alternatives; role of modeling and its advantages and limitations.
- Optimization Modeling: Examples illustrating various types of models, solution methods and applications to water resources infrastructure planning and management.
- Stochastic Optimization Methods applied to hydrologic and water resource systems.
- Methods for Multiple-purpose River Basin Planning.

11. Educational institution	**Anbar University/ College of Engineering**
12. University department/center	**Department of Dams and Water Resources Engineering**
13. Course name/code	**Engineering Optimization / DWE4307**
14. The programs in which he participates	**Bachelor's**
15. Available forms of attendance	**Official working hours**
16. Semester/year	**First semester/ fourth academic year**
17. Number of study hours (total)	**٦٠**
18. The date this description was prepared	**٢٠٢١-٩-٢٥**
19. Course objectives	
A- The student understands the science of optimization Because he one Scientific and applied foundations For dam and water resources engineering. B- It has an important role in increasing the student's intellectual awareness of dealing with engineering problems and achieving solutions for this problems.	

C- Its basic and prominent role in the design of buildings and facilities is related to irrigation and damengineering.

20. Learning outcomes and methods of teaching, learning and evaluation

First : Cognitive objectives

- This course will provide the student an introduction to the planning, design, and operation of water resources systems using mathematical optimization methods and models. The student will learn to apply basic economic analysis and operations research techniques (linear programming, and combinational optimization) and will apply them to the various surface and groundwater resource allocation problems.
- Be able to develop and solve various types of optimization models of water resources planning and management problems.
- Understand the advantages and limitations of various types of modeling methods and algorithms.
- Understand and appreciate how models have been and can be used in planning and management decision-making processes.
- Understand and critically evaluate literature in water resources systems engineering.

Second: Skills objectives of the course

4. A detailed study of the science of geometric optimization.
5. Teach the student after the end of the semester the effect of engineering optimization in making engineering decisions
6. Engineering preparation to be a successful engineer by learning the correct principles of hisspecialty.

A- Teaching and learning methods

1- Providing students with the basics and topics related to previous educational ,outcomes and the skills to solve practical problems through speech, lecture .or presentations
2- .Solving a group of practical and applied examples by the subject teacher
3- Through discussion, students participate in solving some practical .problems.
4- .Daily surprise and continuous weekly tests
5- Directing students to some websites to benefit from them.

: B- Evaluation methods

١- Evaluating students individually by giving them an opportunity to participate .in the class by answering questions

٢- Evaluating students collectively through daily exams with practical and .theoretical questions

٣- Evaluating students collectively by giving extracurricular assignments, such .as writing reports or doing assignments

٤- Permanent monthly exams for students to evaluate their general performance .and understanding of the subject

٥- .Final exams for the first and second round

C- Thinking skills:

5- Knowing and studying how to analyze the forces affecting objects and linking them to reality to direct the student's thought towards practical life.
6- Analyze the results of solving problems and compare them mentally with reality and the extent of their conformity with the actual design values.
7- Analyzing the results obtained by the student by conducting practical reports and determining the extent of their reality.

D- Teaching and learning methods:

6- Using modern means to present the scientific and theoretical aspect, such asData Show devices to attract attention and attract students so that the , idea reaches the student better.

7- Giving students extra-curricular assignments that require them to exert .skills and self-explanations in experimental ways

8- Interrogating students through discussion sessions by asking intellectual questions such as: (how, why, when, where, which) for specific topics.

9- Using the method of brainstorming and mental nutrition in order to activate the accumulated experiences of students by linking the subjects taken in the pre-university educational levels and linking them to the new ones.

10- Providing students with practical skills by linking their studies to practical reality.

E- Evaluation methods:

The evaluation is done on the basis of:

5- Monthly exams: 20%

6- Daily exams: 10%

7- Project: 10%

8- Final exam: 60%

F - General and transferable skills (other skills related to employability and personal development):

2- Enabling students to study engineering optimization in its applied and cognitive aspects.

2- Developing the student's ability to analyze information and interpret the .data he obtained by linking the subject he learned with practical reality

3- Enabling the student to use special and general equations and how to .benefit from them in analyzing problems and extracting results accurately

8- Enabling the student to conduct a field survey to identify the problems .facing the engineer in the field

: Course structure -١١

the week	hours	Required learning outcomes	Name of the unit/course or subject	Teaching method	Evaluation metho
First	٣	Cognitive objectives	Introduction	theoretical	Discussion, quick exar problem solving, homew
Second	٣	Cognitive objectives	Modeling with Linear Programming	theoretical	Discussion, quick exar problem solving, homew
Third	٣	Course-specific skills objectives	Tutorials	theoretical	Discussion, quick exar problem solving, homew
Fourth	٣	Cognitive objectives	Graphical method	theoretical	Discussion, quick exar problem solving, homew
Fifth	٣	Course-specific skills objectives	Tutorials	theoretical	Discussion, quick exam problem solving, homewo
VI	٣	Cognitive objectives	The Simplex Method	theoretical	Discussion, quick exam problem solving, homewo
Seventh	٣	Cognitive objectives	Two-phase method	theoretical	Discussion, quick exam problem solving, homewo
VIII	٣	Course-specific skills objectives	Tutorials	theoretical	Discussion, quick exam problem solving, homewo
Ninth	٣	Cognitive objectives	The Dual Simplex Method	theoretical	Discussion, quick exam problem solving, homewo
The tenth	٣	Course-specific skills objectives	Tutorials	theoretical	Discussion, quick exam problem solving, homewo
eleventh	٣	Course-specific skills objectives	Quiz	theoretical	Discussion, quick exam problem solving, homewo
twelveth	٣	Course-specific skills objectives	Tutorials	theoretical	Discussion, quick exam problem solving, homewo

Thirteenth	۳	Cognitive objectives	Big-M method	theoretical	, discussion, quick exa Problem solving, homew
fourteenth	۳	Cognitive objectives	Duality and Sensitivity Analysis	theoretical	, discussion, quick exa Problem solving, homew
Fifteenth	۳	Cognitive objectives	THE REVISED SIMPLEX METHOD	theoretical	, discussion, quick exa Problem solving, homew
sixteen	۳	Review			

: Infrastructure -۱۲	
:Required readings ▪ Course books ▪ Other	- *Loucks DP and Beek EV (2005) Water Resources Systems Planning and Management. UNESCO* - *Karmouz M., Szidarovszky F., and Zahraie B. (2003) "Water Resources System Analysis", CRC Press* - *Vedula S., and Mujumdar P. P. "Water Resources Systems", McGraw Hill*
Special requirements	nothing
Social services (including, for ,example, guest lectures vocational training, and field (studies	nothing

: Acceptance -۱۳	
Prerequisites	-۱Engineering Statistics -۲Engineering Numerical Methods
The smallest number of students	۱۰
The largest number of students	٤۰

Engineering Statistics

Course Discription

It is one of the important academic subjects for engineering students of all specializations, as it is a combination of applied engineering and statistics, and it teaches the student statistical methods and tools to solve important problems and also the use of statistical models in order to solve scientific and engineering problems for the purpose of improving the process or product, by teaching him to classify data. Its representation and description, probability theory, probability distributions, independent events, variables, covariance, correlation, hypothesis testing for one sample, and others.

1 Educational institution	**Anbar University/College of Engineering**
2 University department/center	**Department of Dams and Water Resources Engineering**
3 Course name/code	**Engineering Statistics / DWE3212**
4 Programs in which it is included	**Bachelor's degree**
5 Available forms of attendance	**Official working hours**
6 Semester/year	**Second semester/ 2022-2023**
7 Number of study hours (total)	**45**
8 The date this description was prepared	**29 January 2022**

9 Course objectives:

A- Teaching the student to classify data, graphical representation, and mathematical description of it.

B- Probability theory, its rules, random variables, and probability distributions.

C- Random variables, normal distribution, independence of random variables, and their statistical details.

D- Increasing the student's intellectual awareness to deal with recurring engineering problems facing his work and devising solutions by benefiting from the repetition of these problems.

10 Learning outcomes, teaching, learning and assessment methods:

First: Knowledge and understanding:

1. Differentiating between a random process and a deterministic process, dealing with data samples and analyzing them using several metrics and presenting them graphically.
2. Learn about probability theory and its applications, and dealing with discrete and continuous random variables.
3. Linking the normal distribution with the statistical sample population in practice and designing good estimates for different criteria for different statistical populations.

Second: Course-specific skills:

1. Judging statistical hypotheses by conducting statistical tests using different significance levels.
2. Use statistical software (Excel, Mat lab, or any other appropriate program) for statistical analysis.
3. Preparing the student to be a successful engineer by learning the correct principles for using statistics in his specialty.

a.Teaching and learning methods:

1. 1. Explaining and clarifying the basics in statistics and topics related to educational outcomes through delivery, lecture, and discussion.
2. Solving a group of applied examples by the subject teacher, with students participating by solving some examples and applied questions.
3. Continuous daily and weekly surprise tests and directing the student to prepare reports on statistics to expand his understanding of the subject.
4. Directing students to some websites to benefit from them.

b.Evaluation methods:

1- Evaluating students individually by giving them an opportunity to participate in the class by answering questions.
2- Evaluating students collectively through daily exams with questions related to the daily and previous subjects.
3- Evaluating students collectively by giving extracurricular assignments, such as writing reports or doing assignments.
4- Monthly exams during the semester for students to evaluate their general performance and understanding of the subject.
5- Final exams for the first and second round.

c. Thinking skills:

1. Knowing and studying how to analyze and arrange data to reach useful inferences from it.
2. Analyzing the results of solving problems and comparing them with the results of different examples and intellectually analyzing the results of difference or convergence in them.
3. Bringing the examples closer to the community and trying to determine the extent of their compatibility with the situations that an engineer may encounter during his work.

d.Teaching and learning methods:

1. Use ordinary means, such as the blackboard, and modern means, such as Data Show devices, to present lectures to attract attention and attract students so that the idea is better conveyed to the student.
2. Guiding and giving students extracurricular assignments for the purpose of making them familiar with methods of collecting and arranging information.
3. Interrogating students through discussion sessions by asking intellectual questions.

4. Using the method of linking the subjects taken in the previous academic stages, while giving examples related to the practice of their specialization to provide them with practical skills to benefit from them in the future.

e.Evaluation methods:

The evaluation is done on the basis of:

1- Monthly exams: 20%
2- Daily exams: 10%
3- Duties: 5%
4- Commitment to working hours + daily participation: 5%
5- Final exam: 60%

f.General and transferable skills (other skills related to employability and personal development):

1- Enabling students to master the subject in its applied and cognitive aspects.
2- Enabling the student to collect and classify data and how to benefit from it in statistical analysis and extracting results.
3- Developing the student's ability to analyze information and interpret the data he obtains by linking the subject he has learned with practical reality

11 Course structure:

Evaluation method	Teaching method	outcomes Name of unit/course or subject	Required learning	Hours	Week
Discussion, quick exam, problem solving, homework	Theoretical	Introduction, Data Summary and Presentation	Introduction, data summary and presentation	3	Seventeent
Discussion, quick exam, problem solving, homework	Theoretical	Probability: Addition rule, conditional probability, multiplication rule and Bayes Theorem.	Probability: addition rule, conditional probability, multiplication rule, Bayes' theorem.	۳	Eighteenth
Discussion, quick exam, problem solving, homework	Theoretical	Discrete random variables. Probability mass function. Mean and variance of discrete random variables.	Discrete random variables. Probabilistic mass function. The mean and variance of discrete random variables.	۳	Nineteenth
Discussion, quick exam, problem solving, homework	Theoretical	Probability Distribution functions: Uniform, Binomial, Geometric and Negative Binomial, Hyper-geometric and Poisson Distribution.	Probability distribution functions: regular binomials	۳	Twentieth.
Discussion, quick exam, problem solving, homework	Theoretical	Continuous random variables. Probability Density functions.	Geometric binomial	۳	Twenty-fir
Discussion, quick exam, problem solving, homework	Theoretical	Normal Distribution. Approximation to Binomial and Poisson Distribution.	Poisson distribution.	۳	Twenty-se
Discussion, quick exam, problem solving, homework	Theoretical	Monthly exam	Continuous random variables. Probability density function	۳	Twenty-thi
Discussion, quick exam, problem solving, homework	Theoretical	Exponential distribution. Other continuous distributions.	Normal distribution. Binomial approximation and Poisson distribution.	۳	Twenty-fou
Discussion, quick exam, problem solving, homework	Theoretical	Joint probability function. Multiple discrete and continuous random variables.	Monthly exam	۳	Twenty-fif
Discussion, quick exam, problem solving, homework	Theoretical	Covariance and correlation. Bivariate Normal Distribution. Linear combination of random variables. Functions of random variables.	Exponential distribution.	۳	Twenty-six
Discussion, quick exam, problem solving, homework	Theoretical	Parameter estimation. Properties of estimators. Method of Moments.	Other ongoing distributions.	۳	Twenty-sev
Discussion, quick exam, problem solving, homework	Theoretical	Method of Maximum likelihood.	Joint probability. Multiple discrete and continuous random variables.	۳	Twenty-eig
Discussion, quick exam, problem solving, homework	Theoretical	Interval estimation. Inference on the mean of a population: variance known or unknown. Inference on the variance of a normal population	Covariance and correlation.	۳	Twenty-nin
Discussion, quick exam, problem solving, homework	Theoretical	Hypothesis testing about the mean and Proportion: Small and Large Sample	Bivariate normal distribution.	۳	Thirtieth.
Discussion, quick exam, problem solving, homework	Theoretical	Hypothesis testing: Two Populations	A linear combination of random variables.	۳	Thirty-firs
2nd Course Exam				۳	Thirty-sec

12 Acceptance:	
Prerequisites	Calculus-II
The smallest number of students	١٠
The largest number of students	٤٠

13 Infrastructure :	
. Required readings: Course books Other	•William Mendenhall and Terry Sincich, Statistics for Engineering and the Sciences, Prentice Hall, 5th ed., 2007
Special requirements Social services (including, for example, guest lectures, vocational training, and field studies(	Non
Social services (including, for example, guest lectures, vocational training, and field studies)	Non

Fundamentals of Electrical Engineering

Module Description Form

Module Information معلومات المادة الدراسية			
Module Title	**Fundamentals of Electrical Engineering**	**Module Delivery**	
Module Type	**Core**	☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**DWE1212**		
ECTS Credits	**5**		
SWL (hr/sem)	**125**		
Module Level	1	**Semester of Delivery**	1
Administering Department	DWE	**College**	ENG

Module Leader	Ahmed Shakir Abdullah	**e-mail**	Ahmed.s.abd@uoanbar.edu.iq
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	Ph.D.
Module Tutor		**e-mail**	
Peer Reviewer Name	Name	**e-mail**	
Scientific Committee Approval Date	04/10/2023	**Version Number**	1.0

Relation with other Modules
العلاقة مع المواد الدراسية الأخرى

Prerequisite module	DWE1201 CALCULUS I	**Semester**	
Co-requisites module	None	**Semester**	

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

Module Objectives أهداف المادة الدراسية	5. To develop problem solving skills and understanding the fundamentals of electrical engineering through the application of techniques. 6. To be able to solve series and parallel DC circuit. 7. To be able to understand Ohms Kirchhoff's current and voltage Laws problems. 8. To be able to analyze Nodal analysis, Mesh analysis, Source transformation. 9. To perform mesh and Nodal analysis. 10. To be able to analyze R, L, C circuit.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	7. Understand the basic concept of electrical circuits. 8. Solve series and parallel DC circuits. 9. Apply Sources in Series and Parallel Voltage Divider Rule-Current Divider Rule 10. Transform circuit from Wye-Delta and visa-versa. 5. Solve Circuit Analysis Techniques (Nodal Analysis, Mesh Analysis, and Superposition). 6. Apply Thevenin's and Norton's Equivalent Circuits.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. - Introduction to electrical engineering, Charge, current, and voltage.[12h] - Ohms law, Kirchhoff laws, Star delta analysis. [15h] - Nodal analysis, Mesh analysis, Source transformation. [18h] - Superposition theorem, Thevenin circuits, Norton circuits.[18h] - Capacitor C, Inductor L, Circuit analysis including R, L, and C.[15h]

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	

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

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	47	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.13
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**125**		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5 and 10	LO #1, #2 and #3, #4
	Assignments	2	10% (10)	2 and 12	LO #3, #4
	Projects / Lab.	1	5% (5)	Continuous	All
	Report	1	5% (5)	13	LO #3, #4
Summative assessment	**Midterm Exam**	2hr	20% (20)	7	LO #1 - #4
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to electrical engineering
Week 2	Charge, current, and voltage
Week 3	Ohms law
Week 4	Ohms law
Week 5	Kirchhoff laws

Week 6	Kirchhoff laws
Week 7	Mid-term Exam + Unit-Step Forcing, Forced Response, the RLC Circuit
Week 8	Star delta analysis
Week 9	Nodal analysis
Week 10	Nodal analysis
Week 11	Mesh analysis
Week 12	Source transformation
Week 13	Superposition theorem
Week 14	Thevenin circuits
Week 15	Norton circuits
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)
المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Charge, current, and voltage
Week 2	Lab 2: Ohms law
Week 3	Lab 3: Kirchhoff laws
Week 4	Lab 4: Star delta analysis
Week 5	Lab 5: Nodal analysis
Week 6	Lab 6: Mesh analysis
Week 7	Lab 7: Superposition theorem

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Alexander and Sadiku “Fundamentals of Electric Circuits” Third Edition McGraw Hill.	YES
Recommended Texts	Boylestad, R. L., Introductory Circuit Analysis (10th Edition).	YES
Websites		

Grading Scheme
مخطط الدرجات

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

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

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

Hydraulic Structures

Module Information
معلومات المادة الدراسية

Module Title	**Hydraulic Structures**	**Module Delivery**	
Module Type	**Core**	☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**DWE3321**		
ECTS Credits	**5**		
SWL (hr/sem)	**125**		

Module Level	UGIII	**Semester of Delivery**	6
Administering Department	DWE	**College**	ENG
Module Leader	Dr. Mohammed Falah Allawi	**e-mail**	Mohammed.falah@uoanabr.edu.iq
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	Ph.D.
Module Tutor	Dr. Mohammed Falah Allawi	**e-mail**	Mohammed.falah@uoanabr.edu.iq
Peer Reviewer Name		**e-mail**	
Scientific Committee Approval Date	01/06/2022	**Version Number**	1.0

Relation with other Modules
العلاقة مع المواد الدراسية الأخرى

Prerequisite module	DWE 2304 Fluid mechanics DWE 2305 Open channels	**Semester**	3,4
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	11. To develop an understanding of the principles of using hydraulic structures as flow measurement structures. 12. To develop an understanding of the principles of design of different hydraulic structures (weirs, culverts, intake and outwork structures spillways, and energy dissipation. 13. This course deals with the basic concept of hydraulic structures.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the end of successful completion of this course, the student will be able to: 1. Ability to identify the types of hydraulic structures. 2. Ability to identify the principals of design in hydraulic structures. 3. Ability to identify the energy and specific energy in open channel. 4. Ability to analyze the problems of regulators and weirs flow and design open channel. 5. Ability to solve analysis and design problems related to bed material. The student will be able to design the culverts. 6. The student will be able to determine the up-lift pressure under the hydraulic structures.
Indicative Contents المحتويات الإرشادية	Introduction, Principles of Hydraulic Systems Analysis, Classification of Structures for Flow Control, Design of floors by bligh theory, Design of floors by lianas theory. (15 hrs). Introduction of Channel Regulating Structures (weirs, barrages, sluice gates, etc.), Quiz with resolve problems and discussion weirs, weirs (Tutorial (examples), Design of sluice gates. (15 hrs). Channel Intake and Outlet (Diversion) Structures, Flow Measurement Structures, Dam Spillways and Outlet Works, Energy Dissipation Structures, Design of sittling basin, Culverts. (15 hrs).

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**125**		

Module Evaluation
تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction
Week 2	Principles of Hydraulic Systems Analysis
Week 3	Classification of Structures for Flow Control
Week 4	Design of floors by bligh theory
Week 5	Design of floors by lianas theory
Week 6	Introduction of Channel Regulating Structures (weirs, barrages, sluice gates, etc.)
Week 7	Quiz with resolve problems and discussion
Week 8	weirs
Week 9	weirs (Tutorial (examples)
Week 10	Design of sluice gates
Week 11	Channel Intake and Outlet (Diversion) Structures
Week 12	Flow Measurement Structures

Week 13	Dam Spillways and Outlet Works
Week 14	Energy Dissipation Structures
Week 15	Design of sittling basin
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)
المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Introduction
Week 2	Lab 2: Discharge Estimation
Week 3	Lab 3: Seepage Estimation
Week 4	Lab 4: Head Pressure Calculation
Week 5	Lab 5: Hydraulic Jump
Week 6	Lab 6: Water Depth Calculation
Week 7	Lab 7: Exam

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	**Textbook(s): open channel hydraulics - chow**	Yes
Recommended Texts	**Hydraulic Structures: Fourth Edition**	Yes
Websites	https://heidarpour.iut.ac.ir/sites/heidarpour.iut.ac.ir/files/u32/open-chow.pdf http://www.khuisf.ac.ir/Dorsapax/Data/Sub_118/File/Hydraulic%20Structures_4th%20edition_.pdf	

Grading Scheme
مخطط الدرجات

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

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

Management and leadership skills

This course is designed for engineering students interested in advancing in managerial and leadership roles. The student will gain perspective on what it means to be an engineering leader. The course is concerned with developing awareness of your strengths and weaknesses as a leader when you are assigned to be in charge of a project and you will learn how to take advantage of your strengths and control your weaknesses. You will also learn how to manage relationships with your team members and how to set up a creative environment for your team to motivate each team member to reach their potential. You will also learn how to deal with various ethical issues related to engineering work.

1	Educational institution	Anbar University
2	University Department / Center	Faculty of Engineering
3	Course Name/Code	Management and leadership skills
4	Programs in which he enters	Dams and Water Resources Engineering
5	Available Attendance Forms	SID.ir |
6	Semester / Year	2021-2022
7	Number of Credit Hours (Total)	28
8	The history of preparation of this description	30-9-2021
9 Course Objectives : 1- Understand the principles of leadership skills 2. Understand the practical applications of leadership skills		

Learning outcomes and teaching, learning and assessment methods

A. Knowledge and understanding

1. Explain the basic concepts of leadership.
2. Build power and influence.
3. Add value to their sphere of influence
4. Give and receive feedback, actively listen, provide supportive communication, and coach and counsel their team members.

B- Subject-specific skills

Teaching and learning methods

Lectures, presentations, questions

Evaluation methods

The evaluation is carried out on the basis of:
1- Monthly exams 20%
2- Daily exams 10%
3- Duties 5%
4- Attendance + daily participation 5%
4- Final exam 50%

C- Thinking skills

Teaching and learning methods

Evaluation methods

D - General and transferred skills (other skills related to employability and personal development).

Course Structure

The week	Hours	Required Learning Outcomes	Name of the unit/course or topic	Method of education	Evaluation method
1,2	4	1. Explain the basic concepts of leadership.	Introduction	Lecture	Exam, Report
2,3,4	8	2. Build power and influence.	**Practical applications**	Lecture	Try
5,6,7	8	3. Add value to their sphere of influence	**Practical applications**	Lecture	Exam, Report
8,9,10	8	4. Give and receive feedback, actively listen, provide supportive communication, and coach and counsel their team members.	**Management and leadership**	Lecture	Try

Infrastructure	
Required readings: ▪ Course Books ▪ Other	
Special requirements	
Social services (e.g. guest lectures, vocational training and field studies)	

Acceptance	
Prerequisites	40
Minimum number of students	No
The largest number of students	50

Method of Construction and Estimation

Course Discription

It is one of the important academic subjects for students of civil engineering in all its branches. The study of this subject aims to teach the student the techniques and practices of various construction equipment, various types of construction activities and hydraulic installations in particular. It also covers various aspects of estimating the quantities of work items related to those works and their various activities, water supply and sanitation works. , irrigation works, price analysis, real estate evaluation, and preparing reports to estimate various items.

14Educational institution	**Anbar University/College of Engineering**
15University department/center	**Department of Dams and Water Resources Engineering**
16Course name/code	**Method of Construction and Estimation / DWE4329**
17Programs in which it is included	**Bachelor's degree**
18Available forms of attendance	**Official working hours**

19Semester/year	**Second semester/ 2021-2022**
20Number of study hours (total)	**60**
21The date this description was prepared	**31 January 2022**

22 Course objectives:

A- Teaching the student the ability to prepare tables of quantities and their details.
B- Teaching the student the ability to calculate the quantities of various buildings and facilities
C- Enabling the student to know the specifications of construction materials and the appropriate dimensions for their calculation.
D- Teaching the student to convert quantities into tables of quantities and bids for projects.
E- Teaching the student how to deal with documents for projects
F- That the student becomes able to calculate the different geometric shapes and proportions of the materials used

23 Learning outcomes, teaching, learning and assessment methods:

First: Knowledge and understanding:

1. The student knows the construction methods used on the work site.
2. The student learns the methods and concepts of calculating different quantities for construction paragraphs.
3. Teach the student how to analyze quantities into their original sources.
4. The student will be able to convert calculated quantities into tables of quantities according to the main specifications.

Second: Course-specific skills:

1. Acquire the skill of reading and preparing a table of quantities.
2. Acquiring the skills of calculating the quantities of various items in construction.
3. Acquiring the skills of analyzing paragraphs into their original resources and quantities.
4. Acquire the skill of how to identify the quality of materials used and their compliance with specifications.

a.Teaching and learning methods:

1. Explaining and clarifying the basics of construction methods and calculating quantities in particular, and topics related to educational outcomes through lecture and discussion.
2. Solving a group of applied examples by the subject teacher, with students participating by solving some examples and applied questions.
3. Continuous daily and weekly surprise tests and directing the student to prepare reports on the subject's vocabulary.
4. Directing students to some websites to benefit from them.

b.Evaluation methods:

1- Evaluating students individually through class participation and oral questions.
2- Evaluating students collectively through daily examinations and extracurricular duties such as writing reports.
3- Monthly or semi-semester exams.
4- Final exams for the first and second round.

c. Thinking skills:

1. Critical thinking (question and answer).
2. Interaction skill
3. Approximate practical examples and try to determine the extent of their compatibility with the situations that the engineer may encounter during the work.

d.Teaching and learning methods:

1. Use ordinary means, such as the blackboard, and modern means, such as Data Show devices, to present lectures to attract attention and attract students so that the idea is better conveyed to the student.
2. Interrogating students through discussion sessions by asking intellectual questions.
3. Using the method of linking the subjects taken in the previous academic stages, while giving examples related to the practice of their specialization to provide them with practical skills to benefit from them in the future.

e.Evaluation methods:

The evaluation is done on the basis of:

1- Monthly exams: 20%
2- Daily exams: 10%
3- Duties: 5%
4- Commitment to working hours + daily participation: 5%
5- Final exam: 60%

f.General and transferable skills (other skills related to employability and personal development):

1- Skill in different methods of carrying out construction works.
2- Arithmetic skills and the ability to calculate and estimate quantities and costs using electronic programs.
3- The skill of learning to use accumulated experiences in the workplace.

24 Course structure:

Evaluation method	Teaching method	outcomes Name of unit/course or subject	Required learning	Hours	Week
Discuss, solve problems	Theoretical	An introduction to construction methods and types of Estimating	Building technology and construction	3	Thirty-thi
Discussion, quick exam, problem solving	Theoretical	Tables of quantities and units used Dividing the construction project into the main activities	Construction industry	٣	Thirty-fou
Discussion, homework	Theoretical	Calculate the quantities of excavation and filling for buildings	Methods of planning construction projects	٣	Thirty-fift
Discussion, quick quiz	Theoretical	Calculation of quantities of concrete parts and molds for buildings 1	Gantt chart	٣	Thirty-six
Discuss, solve problems	Theoretical	Analysis of quantities of construction work	PERT method	٣	Thirty-sev
discussion	Theoretical	Calculation of quantities of concrete parts and molds for buildings 2	Work progress reports	٣	Thirty-eig
	Theoretical	**Monthly exam**	Monthly exam	٣	Thirty-nin
Discussing problem solving, homework	Theoretical	Finishing works for buildings	Balance line method	٣	Fortieth.
Discussion, quick exam, problem solving	Theoretical	Analyzing the amounts of finishing works	Business distribution structure	٣	Forty-first
Discuss your homework	Theoretical	Earth excavation works: digging and filling	Earned value method	٣	Forty-sec
Discussion, quick quiz	Theoretical	Building and construction equipment	Main types of construction contracts	٣	Forty-thir
Discussion, quick quiz	Theoretical	Estimating labor, materials and equipment	Project delivery methods	٣	Forty-fou
discussion	Theoretical	Profit margins, overheads and cost sections	Project cost control systems	٣	Forty-fift
discussion	Theoretical	Engineering specifications for construction works	Value Engineering	٣	Forty-sixt
Discuss, solve problems	Theoretical	Preparing reports and bills of quantities	Resource planning and allocation	٣	Forty-sev
2nd Course Exam				٣	Forty-eigh

26 Acceptance:	
Prerequisites	Technology Building Materials Engineering Drawing
The smallest number of students	١٠
The largest number of students	٤٠

25 Infrastructure :	
. Required readings: Course books Other	Estimating and costing in civil Engineering By: B.N.DUTTA 2012 Civil Estimating. costing and valuation Quantity Surveying for building and civil Eng. works: By P.LBhasin and S.Chand New Delhi CIVIL ESTIMATING and Costing :A.K.UPADHYAY 2010
Special requirements Social services (including, for example, guest lectures, vocational training, and field studies(	Non
Social services (including, for example, guest lectures, vocational training, and field studies)	Scientific trips to project sites

Water resources planning and management

Course description

This course will provide the student an introduction to the planning, design, and operation of water resources systems using mathematical optimization methods and models. The student will learn to apply basic economic analysis (engineering economic and microeconomic analysis) and operations research techniques (linear and nonlinear dynamic programming) and will apply them to various water resource allocation problems.

1. Educational institution	Anbar University/ College of Engineering
2. University department/center	Department of Dams and Water Resources Engineering

3. Course name/code	DWE4307
4. The programs in which participates	Bachelor's
5. Available forms of attendance	Official working hours
6. Semester/year	the chapter Second/ fourth academic year
7. Number of study hours (total)	٦٠
8. The date this description was prepared	٢٠٢١/٩/٢٥

9- Course objectives:

This course will provide the student an introduction to the planning, design, and operation of water resources systems using mathematical optimization methods and models. The student will learn to apply basic economic analysis (engineering economic and microeconomic analysis) and operations research techniques (linear, nonlinear and dynamic programming, and combinatorial optimization) and will apply them to various surface and ground water resource allocation problems.

10- Learning outcomes and methods of teaching, learning and evaluation:

First : Knowledge and understanding:

1. The student knows the management and planning of water resources and its importance in the labormarket.
2. The student determines the division of basic tasks and functions at the work site.
3. The student knows the role of the project manager and what other basic roles he performs at the work site، noting the importance of acquiring practical skills and experience.
4. The student understands the nature of the relationship and interrelationship between the different specializations in engineering work and their practical role, and the student understands the roles of participants in engineeringwork.

Second: Course -specific skills:

1. Developing the student's particular water resources management and planning skills and preparing him scientifically to be a successful engineer in water resources projects.
2. Developing the skills of planning, organizing, directing and controlling as the basics of good management.
3. Developing the student's skill of making appropriate decisions and time management as they are the essence of managing water resources projects.

: A- Teaching and learning methods

1. Explain and clarify the basics in Management and planning of water resources engineering in particular and topics related to education outcomes through delivery, lecture and discussion.
2. Solving a group of applied examples by the subject teacher. Students participate by solving some examples and applied questions.
3. Continuous daily and weekly surprise tests and directing the student to prepare reports on construction management vocabulary and the sequence of logical work paragraphs to expand his understanding of the subject.
4. Directing students to some websites to benefit fromthem.

B – Evaluation methods:

1- Evaluating students individually by giving them an opportunity to participate in the class by answering questions.
2- Evaluating students collectively through daily exams with questions related to the daily and previous subjects.
3- Assessing students collectively by giving extracurricular assignments such as writing reports or doing assignments.
4- Monthly exams during class for students to evaluate their overall performance .and understanding of the material
5- Final exams for the first and second round.

: C- Thinking skills

1. Critical thinking (question and answer).
2. Interaction skill
3. Approximate practical examples and try to determine the extent of their compatibility with the situations that the engineer may encounter during the work.

: D - Teaching and learning methods

1. Data Show devices, in presenting lectures to attract attention and attract students so that the idea is better conveyed to the student.
2. Questioning students through discussion sessions by asking intellectual questions.
3. Using the method of linking the subjects taken in the previous academic stages while giving examples related to the practice of their specialty to provide them with practical skills to benefit from them in the future.

: E- Evaluation methods

:The evaluation is done on the basis of

1- Monthly exams : 20%
2- Daily exams : 10%
3- Duties : 5%
4- Commitment to working hours + daily participation: 5%
5- Final exam : 60%

F - General and transferable skills (other skills related to employability and : (personal development

1- Skill in managing and planning work in water resources engineering projects.
2- The skill of linking scientific planning with practical.
3- The skill of learning to use accumulated experiences in decision-making.

11- Course structure:

Week	Hours	Required learning outcomes	Name of the unit/course or subject	Teaching method	Evaluation method
First	٤		**Introduction: Water Resources Planning and Management, EWRE Program Objectives Water Availability and Use Global Water Resources, Typical domestic water use Water Stress Index, Water Stress, Water Crisis.**	theoretical	**, discussion , Problem solving homework**
Second	٤		**Sustainable Development Sustainability, Principle to Practice Multidisciplinary Adaptive Process Sustainability Criteria**	theoretical	**discussion, quick Solve , exam problems**
Third	٤		**Water Resource Systems Analysis, System Transformation Function, Simulation. Simulation vs Optimization, Modeling Process.**	theoretical	**, Discussion homework**

Fourth	٤		**Water Resources Development, Benefit – Cost Analysis, Direct costs, Cash Flow Diagrams Discount Rate, Incremental DB/DC Method.**	theoretical	**Discussion, quick quiz**
Fifth	٤		**Microeconomics, Consumers, Consumer's Budget Demand, Value, Willingness-to- Pay, Measuring Benefits w/Market Methods using Market Prices Circumstantial Evidence, Imputed WTP Methods using Circumstantial, Evidence summarizing – Measuring, Benefits w/o Market, why estimate ecosystem values. Measures of Ecosystem Values Challenges of Ecosystem Valuation.**	theoretical	**Solve , discussion problems**
VI	٤		**Firms, Profit, The Firm's Problem Revenue, The Firm's Problem – 2nd Way, Cost Functions, and Competitive Firm.**	theoretical	**discussion**
Seventh	٤		**Consumers' WTP, Producers' Cost Pricing, Consumers' & Producers' Surpluses, Surpluses – What they mean Production Functions Stages of Production**	theoretical	**problem Discussing solving , homework**
VIII	٤		**Optimization of Water Resources Introduction: Linear Programming, Nonlinear Programming, Dynamic Programming**	theoretical	**problem Discussing solving , homework**
Ninth	٤		**Linear Programming, Graphical Method, Bounded area, Unbounded, Feasible area, Line feasible solution, Water Resources application by Graphical solution.**	theoretical	**discussion, quick exam, Solve problems**
Tenth	٤		**Classical Optimization methods Linear Programming formulation. feasible solution, optimal, Terminology, Decision variables, Constraints, Objective Function**	theoretical	**your Discuss homework**
Eleventh	٤		**Stream waste load allocation models Linear superposition Linear programming (LP) formulation, Groundwater quality management Optimal steady state pump & treatment design Linear superposition LP formulation, Single reservoirs Multiple reservoirs in series Linear programming (LP) formulation**	theoretical	**Discussion, secret exam**

Twelveth	٤		**Classical Optimization methods Linear Programming the simplex method, one phase, two phase. Water resources, Surface water, Application.**	theoretical	**Discussion, quick quiz**
Thirteenth	٤		**Optimization methods Linear Programming on Revised simplex method Water resources, Surface water, Application**	theoretical	**discussion , Solve problems**
Fourteenth	٤		**Optimization methods Linear Programming on Sensitivity Revised simplex method Water resources, Surface water, Application**	theoretical	**, discussion**
Fifteenth	٤		**Optimization methods Linear Programming on transportation method (Balanced Transportation Problem) Water resources**	theoretical	**discussion , Solve problems**
Sixteen	٣	**2nd Course Exam**			

_ : Infrastructure -١٢	
: readings ▪ Course books ▪ Other	Loucks, Daniel P. and Eelco van Beek, Water Resources Systems Planning and Management: An Introduction to Methods, Models and Applications.
Special requirements	nothing
Social services (including, for example, guest lectures, vocational (training, and field studies	Scientific trips to project sites

: Acceptance	
Prerequisites	engineering statistics, Computer Science
The smallest number of students	١٠
The largest number of students	٤٠

Theory of Structures

Course Weekly Outline

Course Instructor	Zaid Al-Azzawi				
E-mail	zaid.kani@uoanbar.edu.iq				
Title	Theory of Structures				
Course Coordinator	Zaid Al-Azzawi				
Course Description	This course covers the outlines of general principles, indeterminacy and stability, shear and diagrams of structures, trusses, approximate analysis, influence lines and moving con loads, analysis of statically determinate structures, analysis of statically indeterminate str				
Course Objective	1. To impart the principles of elastic structural analysis and behaviour of indete structures. 2. Ability to idealize and analyze statically determinate and indeterminate structures. 3. To enable the student to get a feeling of how real-life structures behave. 4. Familiarity with professional and contemporary issues.				
Course Outcomes	The student after undergoing this course will be able to: 1. To understand analysis of indeterminate structures and adopt an app structural analysis technique. 2. Determine response of structures by classical, iterative and matrix method				
Textbook	Structural Analysis by R. C. Hibbeler- 8th edition.				
References	Theory of Structures by S.P. Timoshenko and D. H. Young - 2nd edition. Theory of Structures by Yuang Yu Hsiegh. Structural Analysis by Aslam Kassimali, 4th edition. Structural and Stress Analysis by Dr. T.H.G Megson – 2nd edition, 2000.				
Course Assessment	Term Tests	Laboratory	Quizzes	Project	Final
	30.0%	0.0%	10.0%	----	60
General Notes					

Course weekly Outline

week	Date	Topics Covered	Lab. Experiment Assignments	N
1		Introduction to structural analysis		
2		Determinacy and stability of structures		
3		Shear and moment diagrams of structures		
4		Shear and moment diagrams of structures		
5		Simple Trusses and Compound Trusses		
6		Complex Trusses OR Approximate Analysis of Structures		M on
7		Influence lines and moving concentrated loads		
8		Influence lines and moving concentrated loads		
9		Deflection of determinate structures		
10		Deflection of determinate structures		
11		Analysis of indeterminate structures- Consistent deformation method.		
12		Analysis of indeterminate structures- Consistent deformation method.		
13		Analysis of indeterminate structures using Slope-Deflection Method		
14		Analysis of indeterminate structures using Moment-Distribution Method		
15		Review		

Course Weekly Outline

Course Instructor	**Dr. Zaid Al-Azzawi**
E-mail	zaid.kani@uoanbar.edu.iq
Title	Engineering Numerical Methods (**DWE3214)**
Course Coordinator	
Course Objective	1. Be aware of the mathematical background for the differe numerical methods introduced in the course.

	2. Understand the different numerical methods to solve t algebraic equations and to solve system of linear and non line equations. 3. Understand the different numerical methods for interpolatio differentiation, integration and solving set of ordinary differenti equations. 4. Understand how numerical methods offer a mean to genera solutions in a manner that can be implemented on digit computers. 5. Use the built in functions in MATLAB and EXCEL. 6. Create MATLAB functions for solving numerical engineeri problems. 7. Work on multidisciplinary projects
Course Description	The numerical methods course involves solving engineeri problems drawn from all fields of engineering. The numeric methods include: error analysis, roots of nonlinear algebra equations, solution of linear and transcendental simultaneo equations, matrix and vector manipulation, curve fitting a interpolation, numerical integration and differentiation, soluti of ordinary and partial differential equations.
Textbook	Numerical Methods for Engineers, S. C. Chapra and R. P Canal McGraw-Hill, 6th edition 2010.
References	- Numerical Methods for Engineers, S. C. Chapra and R. P Canale, McGraw-Hill, edition 2010. - Numerical Methods for Engineers and Scientists by Joe D. Hoffman, 2nd Edition. - Lectures on Numerical Analysis by Dennis Deturck and Herbert S. Wilf. - Numerical Analysis Using MATLAB® and Excel® by Steven T. Karris, 3rd Edition. - Numerical Methods in Engineering with MATLAB® by Jaan Kiusalaas. - Engineering Analysis- Interactive Methods and Programs with FORTRAN, QuickBas MATLAB, and Mathematica by Y. C. Pao. - التحليل الهندسي والعددي التطبيقي د. حسن مجيد حسون الدلفي ومحمود عطا الله مشكور.

Course Assessment	Term Tests	Laboratory	Quizzes	Project	Fina Exar
	(30%)	(10%)	(10%)	----	(50%
General Notes					

Course weekly Outline

week	Date	Topics Covered	Not
1		**Introduction** - Significant digits, precision, accuracy, errors, and number representation - The Taylor series - Maclaurin series -	
2		Chapter 1: Determinants and Matrices	
3		Chapter 2: Systems of Linear Algebraic Equations	
4		Chapter 2: Systems of Linear Algebraic Equations	
5		Chapter 3: Interpolation and Curve fitting	
6		Chapter 4: Numerical Differentiation and Integration	
7		Chapter 5: One-Dimensional Initial Value Problem	
8		Chapter 5: One-Dimensional Initial Value Problem	
9		Chapter 6: One-Dimensional Boundary Value Problem -	
10		Chapter 6: One-Dimensional Boundary Value Problem	
11		Chapter 6: One-Dimensional Boundary Value Problem	
12		Chapter 7: Partial Differential Equations	
13		Chapter 7: Partial Differential Equations	
14		Chapter 7: Partial Differential Equations	
15		Review	

16		Exam	

Construction for Water Resources Projects

Course description form

This course description provides a succinct summary of the most important course characteristics and the learning outcomes the student is expected to achieve demonstrating whether they have made the most of the learning opportunities available. It must be linked to a description the program.

Educational institution	Anbar University/College of Engineering
University department/center	Department of Dams and Water Resources Engineering
Course name/code	Construction for Water Resources Projects DWE2313
The programs participates in	Bachelor's
Available forms of attendance	Official working hours
Semester/year	The second / 2022
).Number of study hours (total	48
The date this description was prepared	2021-2022
Course objectives: 1- The student understands the science of building construction because it is the basis and entry point for dealing with engineering facilities 2-Increasing students' understanding and awareness of how to deal with hydraulic buildings and how to increase their lifespan through the use of appropriate construction materials for use on the work site, in addition to how to protect these facilities from external conditions and methods of constructing them	

Learning outcomes and methods of teaching, learning and evaluation
A- Knowledge and understanding: 1- Learn about the building materials used in hydraulic facilities 2-Enhancing students' awareness of the behavior of hydraulic buildings when exposed to external conditions Identify the mechanical properties and behavior of building materials Discussing everything new in the science of building construction
Skills specific to the subject: 1- A detailed study of the science of building construction Study of the hydraulic properties of buildings Increase the student's awareness of the importance of sustainability when using building materials on the work site Preparing a successful engineer who knows how to deal with hydraulic facilities
Teaching and learning methods Providing students with the basics and topics related to the previous educational outcomes and the skills to solve practical problems through presentation, lecture, or conducting experiments Solving a group of practical and applied examples by the subject teacher Through discussion, students participate in solving some practical problems Daily surprise and continuous weekly tests Directing students to some websites to benefit from them
.
: Evaluation methods Evaluating students individually by giving them an opportunity to participate in the class by answering questions Evaluating students collectively through daily exams with practical and theoretical questions Evaluating students collectively by giving extracurricular assignments, such as writing reports or doing assignments Permanent monthly exams for students to evaluate their general performance and understanding of the subject Final exams for the first and second round

Thinking skills

Knowing and studying the properties of hydraulic buildings and linking them to reality to direct the student's thought towards practical life

Analyzing the results obtained by the student by conducting practical reports and determining the extent of their reality

Teaching and learning methods

Using modern means to present the scientific and theoretical aspect, such as Data Show devices, to attract attention and attract students so that the idea reaches the student better

Giving students extra-curricular assignments that require them to exert skills and self-explanations in experimental ways

Interrogating students through discussion sessions by asking intellectual questions such as: (how, why, when, where, which) for specific topics

Using the method of brainstorming and mental nutrition in order to activate the accumulated experiences of students by linking the subjects taken in the pre-university educational levels and linking them to the new ones Providing students with practical skills by linking their studies to practical reality

Evaluation methods The evaluation is based on

Monthly exams: 20%

Daily exams: 10%

Duties: 5%

Commitment to working hours + daily participation: 5%

Practical exam 10%

Final exam: 50%

General and transferable skills (other skills related to employability and personal development)

Empowering students with the subject in its applied and cognitive aspects

Developing the student's ability to analyze information and interpret the data he obtained by linking the topic he learned with practical reality

Enabling the student to use the specific and general equations of the subject and how to benefit from them in analyzing issues and extracting results accurately

Enabling the student to conduct a field survey to identify the problems facing the engineer in the field

Course structure					
Evaluation method	**Teaching method**	**Name of the unit/course or subject**	**Required learning outcomes**	**Hours**	**Week**
Discussion, quick exam, problem solving, homework	theoretical	2. *Introduction*	1. *Introduction*	2	1
Discussion, quick exam, problem solving, homework	theoretical	3. *Construction materials*	1. *Construction materials*	2	2
Discussion, quick exam, problem solving, homework	theoretical	*Equipment used in the creation of buildings*	*Equipment used in the creation of buildings*	2	3
Discussion, quick exam, problem solving, homework	theoretical	*Equipment used in the creation of buildings*	*Equipment used in the creation of buildings*	2	4
Discussion, quick exam, problem solving, homework	theoretical	*The buildings above ground level*	*The buildings above ground level*	2	5

Discussion, quick exam, problem solving, homework	experimental	*The buildings above ground level*	*The buildings above ground level*	2	6
Discussion, quick exam, problem solving, homework	theoretical	*The buildings below the level of the earth's surface*	*The buildings below the level of the earth's surface*	2	7
Discussion, quick exam, problem solving, homework	experimental	*The buildings below the level of the earth's surface*	*The buildings below the level of the earth's surface*	2	8
Discussion, quick exam, problem solving, homework	theoretical	*The buildings below the level of the earth's surface*	*The buildings below the level of the earth's surface*	2	9
Discussion, quick exam, problem solving, homework	experimental	*Lining.*	*Lining.*	2	10
Discussion, quick exam, problem solving, homework	theoretical	*Lining.*	*Lining.*	2	11
Discussion, quick	theoretical	*The buildings above ground level*	*The buildings above ground level*	2	12

exam, problem solving, homework					

Infrastructure	
Building construction,Zuhir Sako **Internet sites**	Required readings: Course books Other ▪
Engineering studio	Special requirements
nothing	Social services (including, for example, guest lectures, vocational training, and field studies)

admissions

Building materials	Prerequisites
10	The smallest number of students
40	The largest number of students

Environmental Engineering

This course description provides a summary of the most important characteristics of the course and the learning outcomes that the student is expected to achieve, demonstrating whether he or she has made the most of the learning opportunities available. It must be linked to the program description.

Anbar University	1. Educational institution
Dam and water resources engineering	2. University department/center
DWE3308 Environmental Engineering	3. Course name/code
Engineering	4. The programs he participates in
electronic	5. Available forms of attendance
(theoretical)	6. Semester/year
Second semester 2022-2023	7. Number of study hours (total)
45 hours distributed as follows: 3 hours per week	8. Date this description was prepared

Course objectives:

1.Identify the quantity, quality, types and characterization of wastewater generated
2.To understand the properties and the design criteria of the conventional wastewater treatment plant (WWTP).
3. To learn the objectives and methods of sewage treatment and to study the features and function of different primary treatment units.
4. To study the features and function of different secondary treatment units.
5. To learn the objectives and methods of sewage disposal.
6. To learn the objectives and methods of sludge treatment.

9 .Learning outcomes and methods of teaching, learning and evaluation
A. Teaching and learning methods
١. Lectures Theoretical + applied + electronic lectures recorded using Google Classroom with White Board in an interactive manner

B. Evaluation methods

Short exams	١
Homework	٢
Activity + attendance	٣
Monthly exams	٤
Oral exam	٥
final exam	٦

C- Thinking skills

The ability to interact with sources and references
Ability to recognize engineering problems
The ability to correctly evaluate
Ability to make suggestions and solve problems
The ability to conclude and compare

D - General and transferable skills (other skills related to employability and personal development.(

١. Ability to deal with work environment problems
٢. Correct investigation of problems and the ability to find solutions to them
٣. Evaluate, use, and improve work mechanisms
٤. Determine appropriate work standards
5 .Developing the spirit of cooperation and teamwork as one team

13. Course structure

Evaluation method	Teaching method	Name of the unit/course or subject	Required learning outcomes	Hours	Week
Short exam + assignments + attendance and participation	Lectures	Wastewater treatment objective		3	١
Short exam + assignments + attendance and participation	Lectures	Sanitary sewage flow estimation		3	٢
Short exam + assignments + attendance and participation	Lectures	Characteristics and composition of sewage		3	٣
Short exam + assignments + attendance and participation	Lectures	Sewerage system		3	٤
Short exam + assignments + attendance and participation	Lectures	Types and method of wastewater treatment		3	٥
Short exam + assignments + attendance and participation	Lectures	Primary treatment		3	٦
Short exam + assignments + attendance and participation	Lectures	Screens		3	٧
Short exam + assignments + attendance and participation	Lectures	Grit chamber		3	٨
Short exam + assignments + attendance and participation	Lectures	Primary sedimentation tanks		3	٩
Short exam + assignments + attendance and participation	Lectures	Secondary Treatment of Sewage		3	١٠
Short exam + assignments + attendance and participation	Lectures	Biological treatment (activated sludge)		3	١١
Short exam + assignments + attendance and participation	Lectures	Biological treatment (activated sludge)		3	١٢

Short exam + assignments + attendance and participation	Lectures	Trickling filter		3	١٣
Short exam + assignments + attendance and participation	Lectures	Sludge treatment		3	١٤
Short exam + assignments + attendance and participation	Lectures	Advanced treatment		3	١٥

11 .Infrastructure

Reference name	Author name
WATER SUPPLY AND SEWERAGE , , FIFTH Edition	E.W.STEEL & TERENCE J .MCGHEE

Required readings:

- Course books
- Other

Special requirements

12.Acceptance

	Prerequisites
	The smallest number of students
	The largest number of students

Sanitary engineering

This course description provides a summary of the most important characteristics of the course and the learning outcomes that the student is expected to achieve, demonstrating whether he or she has made the most of the learning opportunities available. It must be linked to the program description.

Anbar University	1. Educational institution
Dam and water resources engineering	2. University department/center
DWE3309 Sanitary engineering	3. Course name/code
Engineering	4. The programs he participates in
In class room)theoretical(	5. Available forms of attendance
First semester	6. Semester/year
45 hours distributed as follows: 3 hours per week	7. Number of study hours (total)
٢٠٢٢-٢٠٢1	8. Date this description was prepared

Course objectives:

1. **To know the basics, importance, and methods of water supply.**
2. **To study the various sources and properties of water.**
3. **To understand the various methods of conveyance of water.**
4. **To learn the objectives and methods of water treatment and to study the features and function of different water treatment units.**
5. **To study the various sources and characteristics of water.**
6. **To qualify water demand and population forecasting.**
7. **To understand the properties and the design criteria of the conventional water treatment plant (WTP).**

١٠. Learning outcomes and methods of teaching, learning and assessment
A.Teaching and learning methods

١. Theoretical + applied lectures + electronic lectures recorded using Google Classroom with White Board in an interactive manner.

B.Evaluation methods

Short exams	١
Homework	٢
Activity + attendance	٣
Monthly exams	٤
Oral exam	٥
final exam	٦

C- Thinking skills

The ability to interact with sources and references
Ability to recognize engineering problems
The ability to correctly evaluate
Ability to make suggestions and solve problems
The ability to conclude and compare

D - General and transferable skills (other skills related to employability and personal development١.(. Ability to deal with work environment problems

٢. Correct investigation of problems and the ability to find solutions to them

٣. Evaluate, use and improve work mechanisms

٤. Determine appropriate work standards

.٥Developing the spirit of cooperation and teamwork as one team

١٠.Course structure

Evaluation Method	Teaching method	Name of the unit/course or subject	Required learning outcomes	Hours	week
Short exam + assignments + attendance and participation	Lectures	Introduction of Sanitary Engineering		3	١
Short exam + assignments + attendance and participation	Lectures	Basics of Sanitary and Environmental Engineering		3	٢
Short exam + assignments + attendance and participation	Lectures	Sources of water, the amount of water and sewage		3	٣
Short exam + assignments + attendance and participation	Lectures	Water collection		3	٤
Short exam + assignments + attendance and participation	Lectures	Surface water, quality of water, drinking water standards		3	٥
Short exam + assignments + attendance and participation	Lectures	Water consumption		3	٦
Short exam + assignments + attendance and participation	Lectures	Pumping design		3	٧
Short exam + assignments + attendance and participation	Lectures	Water treatment(coagulation)		3	٨
Short exam + assignments + attendance and participation	Lectures	Water treatment (flocculation)		3	٩
Short exam + assignments + attendance and participation	Lectures	Water treatment (sedimentation)		3	١٠
Short exam + assignments + attendance and participation	Lectures	Water treatment (sedimentation)		3	١١
Short exam + assignments + attendance and participation	Lectures	Water treatment(filtration)		3	١٢
Short exam + assignments +	Lectures	Water treatment(disinfection)		3	١٣

attendance and participation					
Short exam + assignments + attendance and participation	Lectures	Water distribution		3	١٤
Short exam + assignments + attendance and participation	Lectures	Introduction to Advanced Treatments		3	١٥

١١.Infrastructure

Reference name	Author Name
WATER SUPPLY AND SEWERAGE , , FIFTH Edition	E.W.STEEL & TERENCE J .MCGHEE

Required readings:

Course books

- Other

Special requirements

Social services (including, for example, guest lectures, vocational training, and field studies(

١٢.Acceptance

	Prerequisites
	The smallest number of students
	The largest number

Open Ducts Material

Open Channels

It is a branch of water resources topics that is concerned with the study, analysis and design of different types of open channels for flow.

The study of this topic aims to teach and train the student the basics of this specialization and the principles of analysis and design, and the calculation of safety coefficients for each case of design, and the study of considerations and design equations for each case of flow that he needs for subsequent studies.

Course Description

1- Educational institution	Anbar University / College of Engineering
2- University Department / Center	Department of Dams and Water Resources Engineering
3- Course name/code	DWE3314
4- Programs in which it enters	Bachelor
5. Available Forms of Attendance	Official working hours
6- Semester/Year	First Semester / Third Academic Year
7- Number of study hours (total)	48
8. Date of preparation of this description	28/1/2022

9- Course Objectives:

A - Introducing the student to the most important types of open channels and methods of designing them because it is one of the basic scientific topics of dam engineering and water resources.
B - It has an important role in increasing the student's intellectual perceptions to deal with the engineering problems facing hydraulic installations and find solutions to these problems.
C- Its basic and prominent role in preparing designs and plans for open channels related to irrigation engineering and dams.

10- Learning outcomes and methods of teaching, learning and assessment:

First: Cognitive Objectives:

1- Identify the basic types of open channels.

2- Expanding students' perceptions and enhancing the concept of designs by giving them general principles and concepts about the design requirements of open channels.

Second: Course Skills Objectives:

1 - A detailed study of open channels.

2- Studying the mathematical details that the student needs during his study of the subject.

3- Preparing an engineer to be a successful engineer by learning the correct principles of his specialization.

A- Teaching and learning methods:

1- Providing students with the basics and topics related to the previous learning outcomes of skills to solve practical problems through speech, lecture or experiments.

2- Solving a set of practical and applied examples by the subject teacher.

3- Through discussion, students are involved by solving some practical problems.

4- Sudden daily and weekly continuous tests.

5- Guiding students to some websites to benefit from them.

B- Evaluation Methods:

1- Evaluating students individually by giving an opportunity for classroom participation by answering questions.

2- Evaluating students collectively through daily exams with practical and theoretical questions.

3- Evaluating students collectively by giving extracurricular duties such as writing reports or solving assignments.

4- Permanent monthly exams for students to evaluate their overall performance and understanding of the material.

5- Final exams for the first and second rounds.

C- Thinking skills:

1- Knowing and studying how to analyze the factors affecting the flow and turn them into principles of design and link them to reality to direct the student's thought towards practical life.
2- Analyzing the results of solving problems and comparing them with reality mentally and the extent to which they match the actual design values.
3- Analyzing the results obtained by the student by conducting practical reports and reaching the extent of their truth.

D- Teaching and learning methods:

1- Using modern means in presenting the scientific and theoretical side, such as Data Show devices, to attract attention and attract students to better reach the idea to the student.
2- Giving students extracurricular duties that require them to exert skills and self-explanations in experimental ways.
3- Interrogate students through panel discussions by asking intellectual questions such as: (how, why, when, where, any) for specific topics.
4- Using the method of brainstorming and mental nutrition in order to activate the accumulated experiences of students by linking what has been taken from the subjects taken in the pre-university stages and linking them to the new.
5- Providing students with practical skills by linking their studies to practical reality.

E- Evaluation Methods:

The evaluation is carried out on the basis of:
1- Monthly exams: 20%
2- Daily exams: 10%
3- Duties: 5%
4- Commitment to permanence + daily participation: 5%
5- Final exam: 60%

General and transferable skills (other skills related to employability and personal development):

1- Enabling students to study the material in its applied and cognitive aspects.
2- Developing the student's ability to analyze the information and interpret the data obtained by linking the subject he learned with practical reality.
3- Enabling the student to use the special and general equations of the subject and how to benefit from them in analyzing problems and extracting results accurately.
4- Enabling the student to conduct a field survey to identify the problems that fall on the shoulders of the engineer in the field.

11. Course Structure:

e week	Hours	Required Learning Outcomes	Name of the unit/course or topic	Method of education	Evaluation method
ne first	3	**General definition of the subject**	*Introduction,*	theoretical	**Discussion, Quick Exam, Problem Solving, Homework**
econd	3	**Types of flow and ducts**	Types, state, and regims of flow, Kindes of open channel	theoretical	**Discussion, Quick Exam, Problem Solving, Homework**
Third	3	**Special equations for calculating areas**	Channel geometry (rectangular), Channel geometry (others)	theoretical	**Discussion, Quick Exam, Problem Solving, Homework**
ourth	3	**Optimal section theory**	*Best efficient section*	theoretical	**Discussion, Quick Exam, Problem Solving, Homework**
V	3	**Speed distribution of flow section**	**Quiz with resolve problems and discussion** Velocity-distribution coefficients	theoretical	**Discussion, Quick Exam, Problem Solving, Homework**
Sixth	3	Pressure distribution of flow section	Pressure distribution in a channel section Effect of slope on pressure distribution	theoretical	**Discussion, Quick Exam, Problem Solving, Homework**
eventh	3	Energy & Specific Energy	Energy, in open channel specifuc energy in open channel	theoretical	**Discussion, Quick Exam, Problem Solving, Homework**
Eighth	3	**Channel Design**	Design of open channels	theoretical	**Discussion, Quick Exam, Problem Solving, Homework**
Ninth	3	**Practical examples of critical flow design**	**Quiz + resolve problems** Critical flow	theoretical	**Discussion, Quick Exam, Problem Solving, Homework**

X	**3**	**Definition of uniform flow**	Uniform flow (manning equation)	theoretical	**Discussion, Quick Exam, Problem Solving, Homework**
eventh	**3**	**Design for lined duct types**	Design of Erodible channels	theoretical	**Discussion, Quick Exam, Problem Solving, Homework**
welfth	**3**	**Design for corrosive channel types**	- Design of nonerodible channels	theoretical	**Discussion, Quick Exam, Problem Solving, Homework**
irteenth	**3**	Calculating the design dimensions of flow sections	- Determination of section dimentions	theoretical	**Discussion, Quick Exam, Problem Solving, Homework**
urteenth	3	define and use the Lycee equation for channel design	- Lacy equat**ion**	theoretical	**Discussion, Quick Exam, Problem Solving, Homework**
fteenth	3	Examples and review	- **Quiz + resolve questions** *Examples* *Critical slope*	theoretical	**Discussion, Quick Exam, Problem Solving, Homework**
xteenth	3				

12- Infrastructure:	
Required readings: Course Books Other	Open channel hydraulics,ven.te chow
special requirements	There isn't any
Social services (e.g. guest lectures, vocational training and field studies)	There isn't any

13- Acceptance:

Prerequisites	Mechanics of fluids and open channels
Minimum number of students	10
The largest number of students	40

Technology Building Materials

This course description provides a succinct summary of the most important course characteristics and the learning outcomes the student is expected to achieve demonstrating whether they have made the most of the learning opportunities available. It must be linked to a description the program.

Educational institution	Anbar University/College of Engineering
University department/center	Department of Dams and Water Resources Engineering
Course name/code	Technology Building Materials/ DWE2307
The programs participates in	Bachelor's
Available forms of attendance	Official working hours
Semester/year	The first / 2021
).Number of study hours (total	48
The date this description was prepared	2021-2022
2-Course objectives: 1- The student understands the science of building materials because it is the basis and entry point for dealing with engineering facilities 2-Increase students' understanding and awareness of how to deal with building materials and conduct their own tests to indicate their suitability for use on the work site	

Learning outcomes and methods of teaching, learning and evaluation
A- Knowledge and understanding: أ- 1- Learn about the building materials used in concrete structures ب- 2-Enhancing students' awareness of the behavior of building materials ت- when exposed to external conditions 3-Giving the student experience and ability to know which materials ث- are suitable for work by conducting engineering tests Identify the mechanical properties and behavior of building materials ج- Discussing everything new in the science of building materials
Subject-specific skills: 1- A detailed study of the science of building materials -Study the properties of building materials Increase the student's awareness of the importance of sustainability when using building materials on the work site -Preparing a successful engineer who knows how to deal with materials
Teaching and learning methods 1- Providing students with the basics and topics related to the previous educational outcomes and the skills to solve practical problems through presentation, lecture, or conducting experiments. Solving a group of practical and applied examples by the subject teacher Through discussion, students participate in solving some practical problems Daily surprise and continuous weekly tests Directing students to some websites to benefit from them
Evaluation methods: Evaluating students individually by giving them an opportunity to participate in the class by answering questions Evaluating students collectively through daily exams with practical and theoretical questions Evaluating students collectively by giving extracurricular assignments, such as writing reports or doing assignments Permanent monthly exams for students to evaluate their general performance and understanding of the subject Final exams for the first and second round

Thinking skills -Knowing and studying the properties of building materials and linking them to reality to direct the student's thought towards practical life Analyzing the results of laboratory tests and mentally comparing them with reality and the extent of their conformity with the actual design values Analyzing the results obtained by the student by conducting practical reports and determining the extent of their reality
Teaching and learning methods – Using modern means to present the scientific and theoretical aspect, such as Data Show devices, to attract attention and attract students so that the idea reaches the student better Giving students extra-curricular assignments that require them to exert skills and self-explanations in experimental ways Interrogating students through discussion sessions by asking intellectual questions such as: (how, why, when, where, which) for specific topics Using the method of brainstorming and mental nutrition in order to activate the accumulated experiences of students by linking the subjects taken in the pre-university educational levels and linking them to the new ones Providing students with practical skills by linking their studies to practical reality
Evaluation methods The evaluation is based on Monthly exams: 20% Daily exams: 10% Duties: 5% Commitment to working hours + daily participation: 5% Practical exam 10% Final exam: 50%
General and transferable skills (other skills related to employability and personal development) Empowering students with the subject in its applied and cognitive aspects Developing the student's ability to analyze information and interpret the data he obtained by linking the topic he learned with practical reality

Enabling the student to use the specific and general equations of the subject and how to benefit from them in analyzing issues and extracting results accurately Enabling the student to conduct a field survey to identify the problems facing the engineer in the field

Course structure					
Evaluation method	**Teaching method**	**Name of the unit/course or subject**	**Required learning outcomes**	**Hours**	**Week**
Discussion, quick exam, problem solving, homework	theoretical	Theories of Failure	Theories of Failure	3	1
Discussion, quick exam, problem solving, homework	theoretical	Materials Engineering Concepts	Materials Engineering Concepts	3	2
Discussion, quick exam, problem solving, homework	theoretical	Nature of Materials	Nature of Materials	3	3
Discussion, quick exam, problem solving, homework	theoretical	Steel	Steel	3	4
Discussion, quick exam, problem solving, homework	experimental	Steel	Steel	3	5
Discussion, quick exam, problem solving, homework	theoretical	Aluminum	Aluminum	3	6
Discussion, quick exam, problem solving, homework	theoretical	Aggregates	Aggregates	3	7
Discussion, quick exam,	experimental	Aggregate	Aggregate	3	8

problem solving, homework					
Discussion, quick exam, problem solving, homework	theoretical	Portland Cement	Portland Cement	3	9
Discussion, quick exam, problem solving, homework	experimental	Portland Cement	Portland Cement	3	10
Discussion, quick exam, problem solving, homework	theoretical	*Wood*	*Wood*	3	11
Discussion, quick exam, problem solving, homework	experimental	*Wood*	*Wood*	3	12
Discussion, quick exam, problem solving, homework	theoretical	Asphalt	Asphalt	3	13
Discussion, quick exam, problem solving, homework	experimental	Asphalt	Asphalt	3	14

Infrastructure	
admissions	
Chemistry	Prerequisites
10	The smallest number of students
40	The largest number of students
nothing	Social services (including, for example, guest lectures, vocational training, and field studies)

English Language-4

It is necessary to study English-4 in order to help the student to write, read and listen to reach the level of the university student in terms of speaking and taking oral exams in English.

Educational Institution	University of Anbar/College of Engineering
University Department/Center	Dams & Water Resources Department
Course Name/Code	English Language-4
Program	Bachelor
Available Attendance Form	Full Time
Semester/Year	Second Term/2021-2022
Number of Credit Hours	30
Date of Description Preparation	9/10/2021

Course Objectives:

- Its basic and prominent role in the student's access to an academic level that enables him to speak and write.
- Teach students to use their skills in writing more profound topics in the field of dams and water resources.
- Developing students' skills by memorizing as many English vocabulary as possible

Learning outcomes and teaching, learning and assessment methods
First: Cognitive Objectives: 1. Develop professional essay writing . 2. Develop reading skills. 3. Expand reading by increasing the amount of vocabulary. 4. Developing speaking, discussions and debates between students on various topics
Second: Course Skills Objectives : 1- Learn to use the skills of writing stories and essays. 2 -Encourage students to speak without hesitation fear. 3 -Developing the skill of recitation and speaking for students. 4- Writing simple research on different engineering topics
Teaching And Learning Methods
1. Provide students with the basics and topics related to previous learning outcomes through recitation or lecture. 2. Sudden daily and continuous weekly tests . 3. Expanding the discussion of speaking English with the participation .
Evaluation Methods
6. Evaluating students individually by giving an opportunity for classroom participation by answering questions. 7. Evaluating students collectively through daily exams with various questions that depend on the cognitive aspect of the student. 8. Evaluating students collectively by giving extracurricular duties such as writing simple essays. 9. Permanent monthly exams for students to evaluate their general performance and understanding of the material 10.Final exams for the first and second attempts.
Thinking Skills 1. Know and study how to use writing skills in recitation . 2. Encourage the student to learn about writing a real research on a specific topic
Teaching And Learning Methods
5. Using modern means to display the scientific and theoretical side, such as Data Show devices to attract attention and attract students to better reach the idea to the student. 6. Giving students extracurricular assignments that require them to exert skills and self-explanations in experiential ways.

7. Interrogate students through panel discussions by asking thinking questions (how, why, when, where, any) for specific topics.
8. Linking the cognitive aspect to the student's knowledge store to develop speaking and writing skills .

Evaluation Methods

The evaluating according to:

12.Monthly Quizzes	20%
13.Quick Quizzes	10%
14.Assignments	5%
15.Attendance +Participations	5%
16.Final Exams	60%

General and transferable skills (other skills related to employability and personal development).

1. Enabling students to master English 4 in the aspect of fluent speaking.
2. Developing the student's ability to write research with the possibility of presenting it for discussion with students and teachers

Course Structure					
Week	**Hours**	**Required Learning Outcomes**	**Name of the Unit/Course or Topic**	**Method of Education**	**Evaluation Method**
1	2	Student understands lesson	Grammar (The tense system and spoken English) • Vocabulary (Compound of words lifestyle, home town, house-proud) • Reading (A home from home-two people describe their experiences of living abroad) • Listening (‘things I miss from home’) • Speaking (Exchanging information about people who live abroad) • Everyday English (Social expressions) • Writing (Applying for a job)	Thermotical lecture	Discussion, quick exam, and home works
2	2	Student understands lesson	• Grammar (Present perfect, simple and continuous, and spoken English) • Vocabulary (Hot verbs, make, do make way, do damage) • Reading (‘Paradise Lost’- how tourism is destroying the object of its affection) • Listening (An interview Tashi Wheeler about her travels as child with parents) • Speaking (Information Gap) • Everyday English (Exclamations) • Writing (Informal letters and correcting mistakes)	Thermotical lecture	Discussion, quick exam, and home works
3	2	Student understands lesson	• Grammar (Narrative tenses, past simple, Conts, and Perfect) • Vocabulary (books and films) • Reading (Jane Austen-one of the world’s most downloaded authors) • Listening (The money jigsaw-a news item from BBC’s radio) • Speaking (Retelling a news story, responding to a news) • Everyday English (Showing interest and surprise) • Writing (Narrative writing 1)	Thermotical lecture	Discussion, quick exam, and home works
4	2	Student understands lesson	• Grammar (questions and negatives and spoken English) • Vocabulary (Prefixes and Antonyms in context) • Reading (‘Diana and Elvis shot JFK!) • Listening (‘My most memorable lie’- people confess to untruths) • Speaking (Discussion-good and bad lies) • Everyday English (Being polite)	Thermotical lecture	Discussion, quick exam, and home works

			• Writing (Linking ideas)		
5	2	Student understands lesson	• Grammar (Future forms and spoken English) • Vocabulary (Hot verbs-take, put) • Reading ('Today's teenagers are just fine') • Listening arranging to meet-three friends decide a time and a place to get together) • Speaking (Future possibilities in your life) • Everyday English (Telephone conversations) • Writing (writing Emails)	Thermotical lecture	Discussion, quick exam, and home works
6	2	Student understands lesson	• Grammar (Expression of quantity) • Vocabulary (Words with variable stress) • Reading (A profile of two famous brands) • Listening (Radio advertisements-what's the product? What are the selling points?) • Speaking (A lifestyle survey) • Everyday English (Business expression, Numbers, Fractions, decimals, date, time…) • Writing (A consumer survey)	Thermotical lecture	Discussion, quick exam, and home works
7	2	Student understands lesson	• **Grammar** (Modals and related verbs 1, spoken English, Declarative questions, and Question expressing surprise) • **Vocabulary** (Hot verb-get) • **Reading** ('Meet the kippers'-an article about grown-up children who won't leave home) • **Listening** (Getting married-an Indian lady talks about her marriage)	Thermotical lecture	Discussion, quick exam, and home works
8	2	Student understands lesson	• Speaking (The pros and cons of arranged marriage) • Everyday English (Exaggeration and understatement) • Writing (Arguing your case)	Thermotical lecture	Discussion, quick exam, and home works
9	2	Student understands lesson	• Grammar (Relative clauses) • Vocabulary (Adverb collocations and adverb adjectives) • Reading ('Chukotka, the coldest place on earth'-an article about a remote territory of Russia) • Listening (Extreme experiences-people describe their experiences in extreme weather conditions) • Speaking (Making descriptions longer, talking about your experiences) • Everyday English (The world around) • Writing (Describing places)	Thermotical lecture	Discussion, quick exam, and home works
10	2	Student understands lesson	• Grammar (Expressing habit) • Vocabulary (Homonyms and Homophones) • Reading ('People and their money-an article about three very different people) • Listening (A teacher I will never forget-people describe a teacher who made a lasting impression on them)	Thermotical lecture	Discussion, quick exam, and home works

			• Speaking (Discussion-a teacher I'll never forget) • Everyday English (Making your point) • Writing (Writing of talking)		
11	2	Student understands lesson	• Grammar (Modal auxiliary verbs 2) • Vocabulary (Synonyms) • Reading ('How the West was won'-the story of settlers in nineteenth -century America) • Listening (Hilaire Belloc's Tales for children) • Speaking (The murder game-one man drops dead in a country house :) • Everyday English (Metaphors and idioms-the body) • Writing (Formal and informal letters and Emails)	Thermotical lecture	Discussion, quick exam, and home works
12	2	Student understands lesson	• Grammar (Hypothesizing) • Vocabulary (Word pairs) • Reading ('Have you ever wondered'? -the answers to some important questions in life)	Thermotical lecture	Discussion, quick exam, and home works
13	2	Student understands lesson	• Listening (The interpretation of dreams-paul's amazing dream) • Speaking (Practicing a conversation and describing your dreams) • Everyday English (Moans and groans) Writing (narrative writing 2)	Thermotical lecture	Discussion, quick exam, and home works
14	2	Student understands lesson	• Grammar (Articles) • Vocabulary (Hot words-life and time) • Reading ('you are never too old'-A life in the day of Mary Hobson, who gained her PhD aged) • Listening (happy days-people talk about what make them happy and unhappy)	Thermotical lecture	Discussion, quick exam, and home works
15	2	Student understands lesson	• Speaking (Discussion-the different ages of life, and their pros and cons) • Everyday English (Linking and commenting) Writing (Adding emphasis in writing)	Thermotical lecture	Discussion, quick exam, and home works

Infrastructure	
References	John & Liz Soars, "New Headway intermediate- Student's Book", 10th ed 2014
Special Reequipments	
Social services (e.g. guest lectures, vocational training and field studies)	

Acceptance	
Prerequisites	---
Minimum Students Numbers	6
Maximum Students Number	6

Hydraulic structures

Hydraulic installations

It is a branch ofBranches of water resources topics thatHe is interested in studying and analyzingAnd the design of hydraulic facilities such as regulators, culverts, cooling basins, etc.

The study of this subject aims to teach and train the student the basics of this specialty and the principles of analysis and design,And calculate the safety factors for each design case, And study the design considerations and equations for each flow case, which he needs for his subsequent studies.

1-Educational institution	Anbar University/College of Engineering
2-University department/center	Department of Dams and Water Resources Engineering
3-Course name/code	**DWE3306**
4-Programs in which it is included	Bachelor's
5-Available attendance forms	Official working hours
6-Semester/year	Chapter II/Third academic year
7-Number of study hours(total)	45
8-Date this description was prepared	2/10/2021
9-Course objectives:	
أ-Identification requester the most important hydraulic structures and their design methods Because he one Basic topics Scientific For dam and water resources engineering. B-It has an important role in Increasing the student's intellectual awareness to deal with problems the Engineering facing hydraulic structures and find Solutions For these problems. C-turn Basic And prominent in Preparation Designs and plans Its facilities relationship With engineering Irrigation and dams.	
10-Learning outcomes, teaching, learning and assessment methods:	
Firstly:ObjectivesCognitive: 1-identifyTypesthe basicFor hydraulic facilities. 2-Expanding students' awareness and enhancing the conceptDesignsthroughGive themGeneral principles and concepts aboutDesign requirements for hydraulic structures. 3- giveThe student has experience inA study of the reliability of hydraulic structures and the safety factors of these structures. 4- Learn about applications on water (hydraulics)By studying the static pressure of the fluid.	

secondly: ObjectivesSkillsYehForEstablished:

1 - Detailed study For hydraulic facilities.

2 - Study the mathematical details that the student needs during his studies For a substance.

3 - Teaching the student after completing the chapter Academic principal Design and force analysis.

4- Preparation geometric To be an engineer Successful by learning the correct principles of the specialty.

a-Teaching and learning methods:

1- Providing students with the basics and topics related to previous educational outcomes and the skills to solve practical problems through presentation, lecture, or conducting experiments.

2- Solving a group of practical and applied examples by the subject teacher.

3- Through discussion, students participate in solving some practical problems.

4-Continuous daily and weekly surprise tests.

5-Directing students to some websites to benefit from them.

B-**Evaluation methods:**

1- Evaluating students individually by giving them an opportunity to participate in the class by answering questions.

2- Evaluating students collectively through daily exams with practical and theoretical questions.

3- Evaluating students collectively by giving extracurricular assignments, such as writing reports or doing assignments.

4- Permanent monthly exams for students to evaluate their general performance and understanding of the subject.

5- Final exams for the first and second round.

C- Thinking skills:

1-Knowing and studying how to analyze the factors affecting flow and transforming them into design principles and linking them to reality to direct the student's thought towards practical life.

2-Analyzing the results of solving problems and comparing them mentally with reality and the extent of their conformity with the actual design values.

3-Analyzing the results obtained by the student by conducting practical reports and determining the extent of their reality.

Dr-Teaching and learning methods:

1- Using modern means to present the scientific and theoretical aspects, such as devicesData ShowTo attract attention and attract students so that the idea reaches the student better.
2- Giving students extra-curricular assignments that require them to exert skills and self-explanations in experimental ways.
3- Interrogating students through discussion sessions by asking intellectual questions such as: (how, why, when, where, which) for specific topics.
4- Using the method of brainstorming and mental nutrition in order to activate the accumulated experiences of students by linking the subjects taken in the pre-university educational levels and linking them to the new ones.
5- Providing students with practical skills by linking their studies to practical reality.

H-Evaluation methods:

The evaluation is done on the basis of:
1- Monthly exams: 20%
2- Daily exams: 10%
3- Duties: 5%
4- Commitment to working hours + daily participation: 5%
5- Final exam: 60%

And- General and transferable skills (other skills related to employability and personal development):

1-Empowering students with the subject in its applied and cognitive aspects.
2-Developing the student's ability to analyze information and interpret the data he obtained by linking the topic he learned with practical reality.
3-Enabling the student to use the specific and general equations of the subject and how to benefit from them in analyzing issues and extracting accurate results.
4-Enable the student to conduct a field survey to identify the problems facing the engineer in the field.

11-Course structu

the week	hours	Required learning outcomes	Name of the unit/course or subject	Teaching method	Evaluati meth

the first	**3**	**General definition of the topic**	Introduction	theoretical	**Discussion, qu quiz, So proble Homew**
the second	**3**	**Design considerations**	Principles of Hydraulic Systems Analysis	theoretical	**Discussion, qu quiz, So proble Homew**
the third	**3**	**Classification of types of establishments**	Classification of Structures for Flow Control	theoretical	**Discussion, qu quiz, So proble Homew**
the fourth	**3**	**Height pressure calculation and designFlooring**	**Design of floors by bligh theory**	theoretical	**Discussion, qu quiz, So proble Homew**
Fifth	**3**	**Height pressure calculation and designFlooring**	**Design of floors by line,s theory**	theoretical	**Discussion, qu quiz, So proble Homew**
VI	**3**	Introduction to hydraulic facilities regulating flow	*Introduction of Channel Regulating Structures (weirs, barrages, sluice gates, etc.)*	theoretical	**Discussion, qu quiz, So proble Homew**
Seventh	**3**	Exam and review	**Quiz with solve problems and discussion**	theoretical	**Discussion, qu quiz, So proble Homew**
VIII	**3**	**Waste design**	*weirs*	theoretical	**Discussion, qu quiz, So proble Homew**
Ninth	**3**	**Practical examples of dam design**	*weirs*(Tutorial (examples)	theoretical	**Discussion, qu quiz, So proble Homew**
The tenth	**3**	**Gate design**	*Design of sluice gates*	theoretical	**Discussion, qu quiz, So proble Homew**
eleventh	**3**	**Introduction to the types of dams and the function of each**	*Channel Intake and Outlet (Diversion) Structures*	theoretical	**Discussion, qu quiz, So proble Homew**
twelveth	**3**		*Flow Measurement Structures*	theoretical	**Discussion, qu quiz, Prob solving, homew**

Thirteenth	**3**	Design considerations for dam components	*Dam Spillways and Outlet Works*	theoretical	**Discussion, qu quiz, Prob solving, homew**
fourteenth	3	Studying the types of energy dissipators	*Energy Dissipation Structures* Design of sitting basin	theoretical	**Discussion, qu quiz, Prob solving, homew**
Fifteenth	3	Study of ferries and their hydraulic and structural design	*Culverts*	theoretical	**Discussion, qu quiz, Prob solving, homew**
sixteen	3	**2nd Course Exa**			

12-Infrastructure:	
Required readings: Course books ▪ Other ▪	Open channel hydraulics, ven.te chow
Special requirementsH	nothing
Social services (including, for example, guest lectures, vocational training, and field studies)	nothing

13-admissions:	
Prerequisites	Fluid mechanics and open channels
The smallest number of students	10
The largest number of students	40

Groundwater Hydrology

Groundwater Hydrology

It is a branch of water resources topics that is concerned with the study and analysis of groundwater, groundwater reservoirs, wells, the method of recharging groundwater, and others.

The study of this subject aims to teach and train the student the basics of this specialty and the principles of analysis and design, which he needs for his subsequent studies.

University of Anbar	١ـ المؤسسة التعليمية
Dams and Water Resources Engineering Dep.	٢ـ القسم الجامعي / المركز
DWE3305	٣ـ اسم / رمز المقرر
Bachelor's	٤ـ البرامج التي يدخل فيها
Attendance	٥ـ أشكال الحضور المتاحة
First semester/ 2022-2023	٦ـ الفصل / السنة
٤٥	٧ـ عدد الساعات الدراسية (الكلي)
18/9/2021	٨ـ تاريخ إعداد هذا الوصف
٩ـ أهداف المقرر :	
It is concerned with teaching students the basic principles of analyzing and studying groundwater hydrology (flow - wells - recharging - statistical analysis... etc.) with the aim of estimating the amount of available water and planning methods of extraction and treatment or preserving and operating it, addressing issues related to the water budget and developing methods of hydrological calculation and	

accuracy. Determine water discharges, predict future water discharges, and determine the size of reservoirs.

١٠- مخرجات التعلم وطرائق التعليم والتعلم والتقييم:

أولا: الأهداف المعرفية:

The student must be able to:

1. Preparing and analyzing hydrological data for groundwater and using them to solve applied problems.
2. Water budget calculation
3. Researching the types of wells and methods of water extraction
4. Analysis of hydrological prediction of drainage and water levels

ثانيا: الأهداف المهاراتية الخاصة بالمقرر:

1- Think geometrically to estimate and calculate water resources.
2- Explains processes such as shedding, seepage, and seepage and their interactions.
3- It works to solve problems such as drought and a strategy to prevent it or extract groundwater in an economical way.
4- He uses his practical experience, if any, in comparison with the theoretical results of analysis, design and creation the solution

أ- طرائق التعليم والتعلم :

1- Providing students with the basics and topics related to previous educational outcomes and the skills to solve practical problems through presentation, lecture, or conducting experiments.
2- Solving a group of practical and applied examples by the subject teacher.
3- Through discussion, students participate in solving some practical problems.
4- Daily surprise and continuous weekly tests.

Directing students to some websites to benefit from them.

ب- طرائق التقييم :

1- Evaluating students individually by giving them an opportunity to participate in the class by answering questions.
2- Evaluating students collectively through daily exams with practical and theoretical questions.
3- Evaluating students collectively by giving extracurricular assignments, such as writing reports or doing assignments.

4- Permanent monthly exams for students to evaluate their general performance and understanding of the subject.
Final exams for the first and second round.

ج- مهارات التفكير :

1- ١ Knowing and studying how to analyze the factors affecting surface runoff and transforming them into design principles and linking them to reality to direct the student's thought towards practical life.

2- Analyzing the results of solving problems and comparing them mentally with reality and the extent of their conformity with the actual design values.

Analyzing the results obtained by the student by conducting practical reports and determining the extent of their reality.

د- طرائق التعليم والتعلم :

1- Using modern means to present the scientific and theoretical aspect, such as Data Show devices, to attract attention and attract students so that the idea reaches the student better.

2- Giving students extra-curricular assignments that require them to exert skills and self-explanations in experimental ways.

3- Interrogating students through discussion sessions by asking intellectual questions such as: (how, why, when, where, which) for specific topics.

4- Using the method of brainstorming and mental nutrition in order to activate the accumulated experiences of students by linking the subjects taken in the pre-university educational levels and linking them to the new ones.

5- Providing students with practical skills by linking their studies to practical reality.

ه- طرائق التقييم :

يتم التقييم على أساس:

-١ Monthly exams ٢٠٪ :

-٢Daily exams ١٠٪ :

-٣HomeWorks % ٥ :

-٤Attendance % ٥ :

-٥ Final exams% ٦٠ :

و - المهارات العامة والمنقولة (المهارات الأخرى المتعلقة بقابلية التوظيف والتطور الشخصي):

1- Enabling students to master the subject in its applied and cognitive aspects.

2- Developing the student's ability to analyze information and interpret the data he obtained by linking the topic he learned with practical reality.

3- Enabling the student to use the specific and general equations of the subject and how to benefit from them in analyzing issues and extracting results accurately.

4- Enabling the student to conduct a field survey to identify the problems facing the engineer in the field

١١- بنية المقرر:

Evaluation method	Teaching method	unit/course or subject	learning outcomes	Hours	Week
Discussion, quick exam, problem solving, homework	Theory	Introduction	General Introduction	٣	First
Discussion, quick exam, problem solving, homework	Theory	Classification and types of groundwater -Basic definitions: (aquifers, Aquitard, Aquiclude, AquifugeUnsaturated zone and saturated zone.)	Learn Hydrology properties	٣	Second
Discussion, quick exam, problem solving, homework	Theory	-Hydrologic budget and groundwater sources. -Concepts of groundwater pollution	Learn Water Balance	٣	Third
Discussion, quick exam, problem solving, homework	Theory	Aquifers -Aquifers classification: (confined, unconfined and leaky)	Learn Aquifers	٣	Fourth
Discussion, quick exam, problem solving, homework	Theory	Aquifer Parameters: (porosity, recharge and discharge, hydraulic conuctivity, transmissivity, storativity, specific yield) - Anisotropy and heterogeneity	Aquifers propeties	٣	Fifth
Discussion, quick exam, problem solving, homework	Theory	Groundwater flow - Steady state and unsteady state flow	Groundwater movment	٣	Sixth
Discussion, quick exam, problem solving, homework	Theory	**Mid-term Exam**	Exam	٣	Seventh
Discussion, quick exam, problem solving, homework	Theory	-Driving forces of groundwater flow - -principles laws of groundwater flow (Darcy's law)	Learn Darcy's law	٣	Eighth
Discussion, quick exam, problem solving, homework	Theory	Groundwater Resources Development -Exploration -Evaluation -Exploitation	Groundwater dorces	٣	Ninth
Discussion, quick exam, problem solving, homework	Theory	Wells -Well Drilling Methods: - Methods of Drilling Shallow Wells:	Wells	٣	Tenth
Discussion, quick exam, problem solving, homework	Theory	Well Completion -Placement of casing -Cementing of casing -Placement of well screen	Well's types	٣	Eleventh
Discussion, quick exam, problem solving, homewor	Theory	Requirements for Water Well Design -Limitations of dimensions and diameters of casing piping -Intake area: design of well screen, gravel pack design.	Wells requirements	٣	Twelfth

Discussion, quick exam, problem solving, homework	Theory	Groundwater & Pumping Tests -Steady State Radial Flow to Wells:	Pumps	٣	Thirteenth
Discussion, quick exam, problem solving, homework	Theory	-Unsteady State Radial Flow: Theis`s Method and its application, Jacob`s Methods	Unsteady flow	٣	Fourteenth
Discussion, quick exam, problem solving, homework	Theory	-Discharge calculation from early drawdown data (Sen 1986). -Leaky Aquifers	Discharge measurement	٣	Fifteenth
2nd Course Exam				٣	Sixteenth

12: القبول -	
Fluid mechanics, open channel and Statistical	Prerequisites
١٠	The smallest number of students
٥٠	The largest number of students

13: البنية التحتية -	
1- Foundation Design – Principles and Practice, Third Edition, by Donald P. Coduto, 2014, Pearson Education, Inc. 2- Ground water hydrology	Required readings: Course books Other
Nothing	Special requirements
Nothing	Social services (including, for example, guest lectures, vocational training, and field studies)

Engineering Hydrology

Engineering Hydrology

It is a branch of water resources topics that is concerned with the study and analysis of surface water, parts of the hydrological cycle, and others.

The study of this subject aims to teach and train the student the basics of this specialty and the principles of analysis and design, which he needs for his subsequent studies.

University of Anbar	١- المؤسسة التعليمية
Dams and Water Resources Engineering Dep.	٢- القسم الجامعي / المركز
DWE٤٣٠٢	٣- اسم / رمز المقرر
Bachelor's	٤- البرامج التي يدخل فيها
Attendance	٥- أشكال الحضور المتاحة
First semester/ 2022-2023	٦- الفصل / السنة
٤٥	٧- عدد الساعات الدراسية (الكلي)
18/9/2021	٨- تاريخ إعداد هذا الوصف

٩- أهداف المقرر :

It is concerned with teaching students the basic principles of analyzing and studying the stages of the water cycle in nature (precipitation - flow - evaporation - storage) with the aim of estimating the amount of available water and planning and operating water facilities. Addressing issues related to the water budget, developing hydrological calculation methods, accurately determining water discharges, forecasting future water discharges, and determining the size of reservoirs to meet needs. Drinking, irrigation and drying time.

١٠- مخرجات التعلم وطرائق التعليم والتعلم والتقييم:

أولا: الأهداف المعرفية:

The student must be able to:

1. Preparing and analyzing hydrological data and using them to solve applied problems.
2. Water budget calculation
3. Researching the forms of flow
4. Analysis of hydrological prediction of drainage and water levels

ثانيا: الأهداف المهاراتية الخاصة بالمقرر:

1- Think geometrically to estimate and calculate water resources – .
2- Explains processes such as precipitation, runoff, and total evaporation and their interactions.
3- It works on solving problems such as flood and drought and strategies to prevent them.
4- He uses his practical experience, if any, in comparison with the theoretical results of analysis, design and creation the solution

أ- طرائق التعليم والتعلم :

5- Providing students with the basics and topics related to previous educational outcomes and the skills to solve practical problems through presentation, lecture, or conducting experiments.
6- Solving a group of practical and applied examples by the subject teacher.
7- Through discussion, students participate in solving some practical problems.
8- Daily surprise and continuous weekly tests.
9- Directing students to some websites to benefit from them.

ب- طرائق التقييم :

5- Evaluating students individually by giving them an opportunity to participate in the class by answering questions.
6- Evaluating students collectively through daily exams with practical and theoretical questions.
7- Evaluating students collectively by giving extracurricular assignments, such as writing reports or doing assignments.
8- Permanent monthly exams for students to evaluate their general performance and understanding of the subject.
9- Final exams for the first and second round.

ج- مهارات التفكير :

3- Knowing and studying how to analyze the factors affecting surface runoff and transforming them into design principles and linking them to reality to direct the student's thought towards practical life.
4- Analyzing the results of solving problems and comparing them mentally with reality and the extent of their conformity with the actual design values.
5- Analyzing the results obtained by the student by conducting practical reports and determining the extent of their reality.

د- طرائق التعليم والتعلم :

6- Using modern means to present the scientific and theoretical aspect, such as Data Show devices, to attract attention and attract students so that the idea reaches the student better.
7- Giving students extra-curricular assignments that require them to exert skills and self-explanations in experimental ways.
8- Interrogating students through discussion sessions by asking intellectual questions such as: (how, why, when, where, which) for specific topics.
9- Using the method of brainstorming and mental nutrition in order to activate the accumulated experiences of students by linking the subjects taken in the pre-university educational levels and linking them to the new ones.
10- Providing students with practical skills by linking their studies to practical reality.

ه- طرائق التقييم :

يتم التقييم على أساس:

-١ Monthly exams ٪٢٠ :
-٢Daily exams ٪١٠ :
-٣HomeWorks % ٥ :
-٤Attendance % ٥ :
-٥ Final exams% ٦٠ :

و ـ المهارات العامة والمنقولة (المهارات الأخرى المتعلقة بقابلية التوظيف والتطور الشخصي):

5- Enabling students to master the subject in its applied and cognitive aspects.
6- Developing the student's ability to analyze information and interpret the data he obtained by linking the topic he learned with practical reality.
7- Enabling the student to use the specific and general equations of the subject and how to benefit from them in analyzing issues and extracting results accurately.
8- Enabling the student to conduct a field survey to identify the problems facing the engineer in the field.

١١- بنية المقرر:

Evaluation method	Teaching method	unit/course or subject	learning outcomes	Hours	Week
Discussion, quick exam, problem solving, homework	Theory	Introduction	General Introduction	٣	First
Discussion, quick exam, problem solving, homework	Theory	Hydrologic cycle, return periods and water balance	Learn Hydrology properties	٣	Second
Discussion, quick exam, problem solving, homework	Theory	Precipitation, types of precipitation and stream flow measurements	Learn Hydrology properties	٣	Third
Discussion, quick exam, problem solving, homework	Theory	Estimation of missed data, checking data consistency & Rainfall frequency analysis	Data Analysis	٣	Fourth
Discussion, quick exam, problem solving, homework	Theory	Theory of frequency analysis for design storms and design floods	Analysis and Design	٣	Fifth
Discussion, quick exam, problem solving, homework	Theory	Measurement of evaporation and estimation of potential evaporation	Analysis and Design	٣	Sixth
Discussion, quick exam, problem solving, homework	Theory	**Mid-term Exam**	Exam	٣	Seventh
Discussion, quick exam, problem solving, homework	Theory	Infiltration, Factors affecting infiltration, Measurement and estimation of infiltration process	Properties measurements	٣	Eighth
Discussion, quick exam, problem solving, homework	Theory	Hydrographs, Introduction and Unit Hydrographs	Properties measurements	٣	Ninth
Discussion, quick exam, problem solving, homework	Theory	Hydrograph application, Time Area Models and Synthetic Unit Hydrographs	Hydrology Application	٣	Tenth
Discussion, quick exam, problem solving, homework	Theory	Channel Intake and Flood routing: channel & reservoir routing	Analysis and Design	٣	Eleventh
Discussion, quick exam, problem solving, homewor	Theory	Introduction to groundwater and Movement of ground water and Transmissibility	General Introduction	٣	Twelfth
Discussion, quick exam, problem solving, homework	Theory	Applications of binominal distribution for defining the return period in engineering design	Hydrology application	٣	Thirteenth

Discussion, quick exam, problem solving, homework	Theory	Normal distribution and its application and relationship to hydraulic designs	Statistical application	٣	Fourteenth
Discussion, quick exam, problem solving, homework	Theory	Statistical distributions and their applications in flood analysis	Statistical application	٣	Fifteenth
2nd Course Exam				٣	Sixteenth

١٣- القبول :	
Fluid mechanics, open channel and Statistical	Prerequisites
١٠	The smallest number of students
٥٠	The largest number of students

١٢- البنية التحتية :	
3- Warren vissman , Introduction to hydrology, 5th ed, 2003. 4- Ven Te Chow, Applied hydrology. 5- Em. Wilson, Engineering hydrology.	Required readings: Course books Other
Nothing	Special requirements
Nothing	Social services (including, for example, guest lectures, vocational training, and field studies)

Drainage engineering subject

Course description

Drainage engineering

It is a branch of water resources topics that is concerned with studying the types of drains and their design methods, such as surface and underground sinks, in addition to analyzing the work of wells.
The study of this subject aims to teach and train the student on the basics of this specialty and the principles of analysis and design, calculating safety factors for each case of design, and studying design considerations and equations for each case.

1- Educational institution	Anbar University/College of Engineerin
2- University Department/Center	Department of Dams and Water Resour Engineering
3- Course name/code	DWE ٤٣٣٠
4- Programs that include	bachelor's degree
5- Available forms of attendance	official working hours
6- Semester/Year	Second semester/Fourth academic year
7- The total number of study hours	60 hours
8- The date this description was prepared	20/9/2021

9- Course objectives:

A - Introducing the student to the most important types of drains used in agricultural lands and their design methods because it is one of the basic scientific topics for engineering dams and water resources.
B- It has an important role in increasing the student's awareness of dealing with puncture systems and the full ability to design these systems.
C- Its basic and prominent role in preparing designs and plans for facilities related to irrigation and drainage engineering.

10- Learning outcomes and methods of teaching, learning and evaluation:

First: Cognitive objectives:

1- Learn about the basic types of drinage systems.
2- Enhancing the concept of designs by giving them general principles and concepts about the design requirements of drinage systems.
3- Familiarity with the different puncture methods and the principles of appropriate selection.
4- Knowing the most important agricultural drainage, its types and objectives.
Second: Skills objectives for the course:
1 - A detailed study of drainage systems.
2 - Study the mathematical details that the student needs while studying the subject.
3 - Teach the student after the end of the semester the principle of designing and choosing the appropriate type of drainage system.
4- Engineering preparation to be a successful engineer by learning the correct principles of his specialty.

A- Teaching and learning methods:

1- Providing students with the basics and topics related to previous educational outcomes and the skills to solve practical problems through presentation, lecture, or conducting experiments.
2- Solving a group of practical and applied examples by the subject teacher.
3- Through discussion, students participate in solving some practical problems.
4- Surprise daily, weekly, continuous and monthly tests.
5- Directing students to some websites to benefit from them.

B- Evaluation methods:

1- Evaluating students individually by giving them an opportunity to participate in the class by answering questions.
2- Evaluating students collectively through daily exams with practical and theoretical questions.
3- Evaluating students collectively by giving extracurricular assignments, such as writing reports or doing assignments.
4- Permanent monthly exams for students to evaluate their general performance and understanding of the subject.
5- Final exams for the first and second round.

C- Thinking skills:

1- Guiding the student to understand the importance of the drainage system applied to agricultural lands.
2- The student will acquire the ability to choose and implement agricultural drainage systems.
3- Analyzing the results obtained by the student by conducting practical reports and determining the extent of their reality.

D- Teaching and learning methods:

1- Using modern means to present the scientific and theoretical aspect, such as Data Show devices, to attract attention and attract students so that the idea reaches the student better.
2- Giving students extra-curricular assignments that require them to exert skills and self-explanations in experimental ways.
3- Interrogating students through discussion sessions by asking intellectual questions such as: (how, why, when, where, which) for specific topics.
4- Using the method of brainstorming and mental nutrition in order to activate the accumulated experiences of students by linking the subjects taken in the pre-university educational levels and linking them to the new ones.
5- Providing students with practical skills by linking their studies to practical reality.

E- Evaluation methods:

The evaluation is done on the basis of:
1- Monthly exams: 20%
2- Daily exams: 10%
3- Duties: 5%
4- Commitment to working hours + daily participation: 5%
5- Final exam: 60%

F - General and transferable skills (other skills related to employability and personal development):

1- Enabling students to master the subject in its applied and cognitive aspects.
2- Developing the student's ability to analyze information and interpret the data he obtained by linking the topic he learned with practical reality.
3- Enabling the student to use the specific and general equations of the subject and how to benefit from them in analyzing issues and extracting results accurately.

11- Course structure:

Week	Hours	Required learning outcomes	Name of unit/course or subject	Teaching method	Evaluation method
first	3	general definition of the topic	introduction to drainage	Theoretical	discussion problem solving, homework

Second	3	Knowledge and understanding	types of covered drains systems	Theoretical	Theoretica discussion problem solving, homework
Third	3	Design considerations	Design of open drains sections	Theoretical	Theoretica discussion problem solving, homework
Fourth	3	Knowledge and Understanding	Internal drainage	Theoretical	Theoretica discussion problem solving, homework
Fifth	3	Design considerations	interference between wells	Theoretical	Theoretica discussion problem solving, homework
Sixth	3	Knowledge and Understanding	the effect resulting from pumping multiple wells for a short period	Theoretical	Theoretica discussion problem solving, homework
Seventh	3	Exam and review	Exam and discussion of results	Theoretical	Theoretica discussion problem solving, homework
Eighth	3	Understanding and Determination	The distances between the drains	Theoretical	Theoretica discussion problem solving, homework
Ninth	3	Design Considerations	Hugout Equation	Theoretical	Theoretica discussion problem solving, homework
Tenth	3	Design Considerations	Ernst equation	Theoretical	Theoretica discussion problem

					solving, homework
Eleventh	3	Understanding and Determination	Comparison between the Hugout and Ernst equation	Theoretical	Theoretica discussion problem solving, homework
Twelfth	3	Exam and review	Exam and discuss the results	Theoretical	Theoretica discussion problem solving, homework
Thirteenth	3	knowledge and understanding	permeability	Theoretical	Theoretica discussion problem solving, homework
Fourteenth	3	Design and cognitive considerations	Permeability of stratified soils	Theoretical	Theoretica discussion problem solving, homework
Fifteenth	3	Exam and general review	Exam and discussion of results	Theoretical	Theoretica discussion problem solving, homework

13- Infrastructure:	
Required readings: □ Course books □ Other	-Irrigation and drainage engineering - drainage engineering

Special requirements	nothing
Social services (including, for example, guest lectures, vocational training, and field studies)	nothing

12- Acceptance:	
Prerequisites	40 students

The smallest number of students	10
The largest number of students	40

Sanitary engineering

This course description provides a summary of the most important characteristics of the course and the learning outcomes that the student is expected to achieve, demonstrating whether he or she has made the most of the learning opportunities available. It must be linked to the program description.

Anbar University	1. Educational institution
Dam and water resources engineering	2. University department/center
DWE3309 Sanitary engineering	3. Course name/code
Engineering	4. The programs he participates in
In class room)theoretical(	5. Available forms of attendance
First semester	6. Semester/year
45 hours distributed as follows: 3 hours per week	7. Number of study hours (total)
٢٠٢١-٢٠٢٢	8. Date this description was prepared

Course objectives:

1. **To know the basics, importance, and methods of water supply.**
2. **To study the various sources and properties of water.**
3. **To understand the various methods of conveyance of water.**
4. **To learn the objectives and methods of water treatment and to study the features and function of different water treatment units.**
5. **To study the various sources and characteristics of water.**
6. **To qualify water demand and population forecasting.**
7. **To understand the properties and the design criteria of the conventional water treatment plant (WTP).**

١٠ . Learning outcomes and methods of teaching, learning and assessment

A.Teaching and learning methods

١. Theoretical + applied lectures + electronic lectures recorded using Google Classroom with White Board in an interactive manner.

B.Evaluation methods

Short exams	١
Homework	٢
Activity + attendance	٣
Monthly exams	٤
Oral exam	٥
final exam	٦

C- Thinking skills

The ability to interact with sources and references
Ability to recognize engineering problems
The ability to correctly evaluate
Ability to make suggestions and solve problems
The ability to conclude and compare

D - General and transferable skills (other skills related to employability and personal development

١.(. Ability to deal with work environment problems
٢. Correct investigation of problems and the ability to find solutions to them
٣. Evaluate, use and improve work mechanisms
٤. Determine appropriate work standards
٥.Developing the spirit of cooperation and teamwork as one team

11..Course structure

Evaluation Method	Teaching method	Name of the unit/course or subject	Required learning outcomes	Hours	week
Short exam + assignments + attendance and participation	Lectures	Introduction of Sanitary Engineering		3	١
Short exam + assignments + attendance and participation	Lectures	Basics of Sanitary and Environmental Engineering		3	٢
Short exam + assignments + attendance and participation	Lectures	Sources of water, the amount of water and sewage		3	٣
Short exam + assignments + attendance and participation	Lectures	Water collection		3	٤
Short exam + assignments + attendance and participation	Lectures	Surface water, quality of water, drinking water standards		3	٥
Short exam + assignments + attendance and participation	Lectures	Water consumption		3	٦
Short exam + assignments + attendance and participation	Lectures	Pumping design		3	٧
Short exam + assignments + attendance and participation	Lectures	Water treatment(coagulation)		3	٨
Short exam + assignments + attendance and participation	Lectures	Water treatment (flocculation)		3	٩
Short exam + assignments + attendance and participation	Lectures	Water treatment (sedimentation)		3	١٠
Short exam + assignments + attendance and participation	Lectures	Water treatment (sedimentation)		3	١١
Short exam + assignments + attendance and participation	Lectures	Water treatment(filtration)		3	١٢

Short exam + assignments + attendance and participation	Lectures	Water treatment(disinfection)		3	١٣
Short exam + assignments + attendance and participation	Lectures	Water distribution		3	١٤
Short exam + assignments + attendance and participation	Lectures	Introduction to Advanced Treatments		3	١٥

١2.Infrastructure

Reference name	Author Name
WATER SUPPLY AND SEWERAGE , , FIFTH Edition	E.W.STEEL & TERENCE J .MCGHEE

Required readings:

Course books

- Other

Special requirements

Social services (including, for example, guest lectures, vocational training, and field studies(

١3.Acceptance

	Prerequisites
	The smallest number of students
	The largest number

Irrigation Engineering

This course description provides a summary of the most important characteristics of the course and the learning outcomes that the student is expected to achieve, demonstrating whether he or she has made the most of the learning opportunities available. It must be linked to the program description.

Anbar University	1. Educational institution
Dam and water resources engineering	2. University department/center
DWE4304 Irrigation Engineering	3. Course name/code
Engineering	4. The programs he participates in
electronic	5. Available forms of attendance
(theoretical)	6. Semester/year
Second semester 2021-2022	7. Number of study hours (total)
45 hours distributed as follows: 4 hours per week	8. Date this description was prepared
Course objectives: 1. **To know the basics, importance, and methods of Irrigation Engineering.** **2. To study of water consumption of crops.** **3. To understand the relationship between soil, water and crops.** **4. To learn the objectives and methods of Irrigation Engineering.** **5.To study the Irrigation Efficiencies.** **6. Study the irrigation structures.** **7.To understand the water infiltration in the soil.**	

9 .Learning outcomes and methods of teaching, learning and evaluation
A. Teaching and learning methods

١

. Lectures

Theoretical + applied + electronic lectures recorded using Google Classroom with White Board in an interactive manner

B. Evaluation methods

Short exams	١
Homework	٢
Activity + attendance	٣
Monthly exams	٤
Oral exam	٥
final exam	٦

C- Thinking skills

The ability to interact with sources and references
Ability to recognize engineering problems
The ability to correctly evaluate
Ability to make suggestions and solve problems
The ability to conclude and compare

D - General and transferable skills (other skills related to employability and personal development).

١. Ability to deal with work environment problems
٢. Correct investigation of problems and the ability to find solutions to them
٣. Evaluate, use, and improve work mechanisms
٤. Determine appropriate work standards
5. Developing the spirit of cooperation and teamwork as one team

10.Course structure

Evaluation method	Teaching method	Name of the unit/course or subject	Required learning outcomes	Hours	Week
Short exam + assignments + attendance and participation	**Lectures**	Introduction of Irrigation Engineering		3	١
Short exam + assignments + attendance and participation	**Lectures**	Estimation consumption use		3	٢
Short exam + assignments + attendance and participation	**Lectures**	Basic factors for irrigation design		3	٣
Short exam + assignments + attendance and participation	**Lectures**	Soil water		3	٤
Short exam + assignments + attendance and participation	**Lectures**	Irrigation Efficiencies		3	٥
Short exam + assignments + attendance and participation	**Lectures**	Irrigation Methods		3	٦
Short exam + assignments + attendance and participation	**Lectures**	Continuous discharge		3	٧
Short exam + assignments + attendance and participation	**Lectures**	Intermittent discharge		3	٨
Short exam + assignments + attendance and participation	**Lectures**	Water duty.		3	٩
Short exam + assignments + attendance and participation	**Lectures**	Irrigation Canal		3	١٠
Short exam + assignments + attendance and participation	**Lectures**	Irrigation pumping		3	١١
Short exam + assignments + attendance and participation	**Lectures**	Irrigation structures		3	١٢

Short exam + assignments + attendance and participation	**Lectures**	Siphon design		3	١٣
Short exam + assignments + attendance and participation	**Lectures**	Canal fall Introduction.		3	١٤
Short exam + assignments + attendance and participation	**Lectures**	Type of canal fall		3	١٥

١٥ البنية التحتية	
القراءات المطلوبة : ▪ كتب المقرر ▪ اخرى	**اسم المؤلف** / **اسم المرجع** Mohammed al sallawe & Amer mohammed / IRRIGATION AND DRAINAGE ENGINEERING
متطلبات خاصة	
الخدمات الاجتماعية (وتشمل على سبيل المثال محاضرات الضيوف والتدريب المهني والدراسات الميدانية)	

12.Acceptance	
Prerequisites	
The smallest number of students	
The largest number of students	

Environmental Engineering

This course description provides a summary of the most important characteristics of the course and the learning outcomes that the student is expected to achieve, demonstrating whether he or she has made the most of the learning opportunities available. It must be linked to the program description.

Anbar University	1. Educational institution
Dam and water resources engineering	2. University department/center
DWE3308 Environmental Engineering	3. Course name/code
Engineering	4. The programs he participates in
electronic	5. Available forms of attendance
(theoretical)	6. Semester/year
Second semester 2021-2022	7. Number of study hours (total)
45 hours distributed as follows: 3 hours per week	8. Date this description was prepared
Course objectives: **1.Identify the quantity, quality, types and characterization of wastewater generated** **2.To understand the properties and the design criteria of the conventional wastewater treatment plant (WWTP).** **3. To learn the objectives and methods of sewage treatment and to study the features and function of different primary treatment units.** **4. To study the features and function of different secondary treatment units.** **5. To learn the objectives and methods of sewage disposal.** **6. To learn the objectives and methods of sludge treatment.**	

9 .Learning outcomes and methods of teaching, learning and evaluation
A. Teaching and learning methods

١. Lectures

Theoretical + applied + electronic lectures recorded using Google Classroom with White Board in an interactive manner

B. Evaluation methods

Short exams	١
Homework	٢
Activity + attendance	٣
Monthly exams	٤
Oral exam	٥
final exam	٦

C- Thinking skills

The ability to interact with sources and references
Ability to recognize engineering problems
The ability to correctly evaluate
Ability to make suggestions and solve problems
The ability to conclude and compare

D - General and transferable skills (other skills related to employability and personal development.(

١. Ability to deal with work environment problems
٢. Correct investigation of problems and the ability to find solutions to them
٣. Evaluate, use, and improve work mechanisms
٤. Determine appropriate work standards
5 .Developing the spirit of cooperation and teamwork as one team

Course structure					
Evaluation method	**Teaching method**	**Name of the unit/course or subject**	**Required learning outcomes**	**Hours**	**Week**
Short exam + assignments + attendance and participation	Lectures	Wastewater treatment objective		3	١
Short exam + assignments + attendance and participation	Lectures	Sanitary sewage flow estimation		3	٢
Short exam + assignments + attendance and participation	Lectures	Characteristics and composition of sewage		3	٣
Short exam + assignments + attendance and participation	Lectures	Sewerage system		3	٤
Short exam + assignments + attendance and participation	Lectures	Types and method of wastewater treatment		3	٥
Short exam + assignments + attendance and participation	Lectures	Primary treatment		3	٦
Short exam + assignments + attendance and participation	Lectures	Screens		3	٧
Short exam + assignments + attendance and participation	Lectures	Grit chamber		3	٨
Short exam + assignments + attendance and participation	Lectures	Primary sedimentation tanks		3	٩
Short exam + assignments + attendance and participation	Lectures	Secondary Treatment of Sewage		3	١٠
Short exam + assignments + attendance and participation	Lectures	Biological treatment (activated sludge)		3	١١
Short exam + assignments + attendance and participation	Lectures	Biological treatment (activated sludge)		3	١٢

Short exam + assignments + attendance and participation	Lectures	Trickling filter		3	١٣
Short exam + assignments + attendance and participation	Lectures	Sludge treatment		3	١٤
Short exam + assignments + attendance and participation	Lectures	Advanced treatment		3	١٥

11 .Infrastructure

Reference name	Author name
WATER SUPPLY AND SEWERAGE , , FIFTH Edition	E.W.STEEL & TERENCE J .MCGHEE

Required readings:

- Course books
- Other

Special requirements

Social services (including, for example, guest lectures, vocational training, and field studies(

12.Acceptance

Prerequisites

The smallest number of students

The largest number of students

Groundwater Hydrology

Groundwater Hydrology

It is a branch of water resources topics that is concerned with the study and analysis of groundwater, groundwater reservoirs, wells, the method of recharging groundwater, and others.

The study of this subject aims to teach and train the student the basics of this specialty and the principles of analysis and design, which he needs for his subsequent studies.

University of Anbar	١ـ المؤسسة التعليمية
Dams and Water Resources Engineering Dep.	٢ـ القسم الجامعي / المركز
DWE3305	٣ـ اسم / رمز المقرر
Bachelor's	٤ـ البرامج التي يدخل فيها
Attendance	٥ـ أشكال الحضور المتاحة
First semester/ 2022-2023	٦ـ الفصل / السنة
٤٥	٧ـ عدد الساعات الدراسية (الكلي)
18/9/2021	٨ـ تاريخ إعداد هذا الوصف
٩ـ أهداف المقرر :	
It is concerned with teaching students the basic principles of analyzing and studying groundwater hydrology (flow - wells - recharging - statistical analysis... etc.) with the aim of estimating the amount of available water and planning methods of extraction and treatment or preserving and operating it, addressing issues related to the water budget and developing methods of hydrological calculation and	

accuracy. Determine water discharges, predict future water discharges, and determine the size of reservoirs.

١٠ـ مخرجات التعلم وطرائق التعليم والتعلم والتقييم:

أولا: الأهداف المعرفية:

The student must be able to:

5. Preparing and analyzing hydrological data for groundwater and using them to solve applied problems.
6. Water budget calculation
7. Researching the types of wells and methods of water extraction
8. Analysis of hydrological prediction of drainage and water levels

ثانيا: الأهداف المهاراتية الخاصة بالمقرر:

1- Think geometrically to estimate and calculate water resources.
2- Explains processes such as shedding, seepage, and seepage and their interactions.
3- It works to solve problems such as drought and a strategy to prevent it or extract groundwater in an economical way.
4- He uses his practical experience, if any, in comparison with the theoretical results of analysis, design and creation the solution

أ- طرائق التعليم والتعلم :

10- Providing students with the basics and topics related to previous educational outcomes and the skills to solve practical problems through presentation, lecture, or conducting experiments.
11- Solving a group of practical and applied examples by the subject teacher.
12- Through discussion, students participate in solving some practical problems.
13- Daily surprise and continuous weekly tests.

Directing students to some websites to benefit from them.

ب- طرائق التقييم :

10- Evaluating students individually by giving them an opportunity to participate in the class by answering questions.
11- Evaluating students collectively through daily exams with practical and theoretical questions.
12- Evaluating students collectively by giving extracurricular assignments, such as writing reports or doing assignments.

13- Permanent monthly exams for students to evaluate their general performance and understanding of the subject.
Final exams for the first and second round.

ج- مهارات التفكير :

6- ١ Knowing and studying how to analyze the factors affecting surface runoff and transforming them into design principles and linking them to reality to direct the student's thought towards practical life.

7- Analyzing the results of solving problems and comparing them mentally with reality and the extent of their conformity with the actual design values.

Analyzing the results obtained by the student by conducting practical reports and determining the extent of their reality.

د- طرائق التعليم والتعلم :

11- Using modern means to present the scientific and theoretical aspect, such as Data Show devices, to attract attention and attract students so that the idea reaches the student better.

12- Giving students extra-curricular assignments that require them to exert skills and self-explanations in experimental ways.

13- Interrogating students through discussion sessions by asking intellectual questions such as: (how, why, when, where, which) for specific topics.

14- Using the method of brainstorming and mental nutrition in order to activate the accumulated experiences of students by linking the subjects taken in the pre-university educational levels and linking them to the new ones.

15- Providing students with practical skills by linking their studies to practical reality.

ه- طرائق التقييم :

يتم التقييم على أساس:

-١ Monthly exams ٢٠٪ :

-٢Daily exams ١٠٪ :

-٣HomeWorks % ٥ :

-٤Attendance % ٥ :

-٥ Final exams% ٦٠ :

و - المهارات العامة والمنقولة (المهارات الأخرى المتعلقة بقابلية التوظيف والتطور الشخصي):

9-Enabling students to master the subject in its applied and cognitive aspects.

10- Developing the student's ability to analyze information and interpret the data he obtained by linking the topic he learned with practical reality.

11- Enabling the student to use the specific and general equations of the subject and how to benefit from them in analyzing issues and extracting results accurately.

12- Enabling the student to conduct a field survey to identify the problems facing the engineer in the field

١١- بنية المقرر:

Evaluation method	Teaching method	unit/course or subject	learning outcomes	Hours	Week
Discussion, quick exam, problem solving, homework	Theory	Introduction	General Introduction	٣	First
Discussion, quick exam, problem solving, homework	Theory	Classification and types of groundwater -Basic definitions: (aquifers, Aquitard, Aquiclude, AquifugeUnsaturated zone and saturated zone.)	Learn Hydrology properties	٣	Second
Discussion, quick exam, problem solving, homework	Theory	-Hydrologic budget and groundwater sources. -Concepts of groundwater pollution	Learn Water Balance	٣	Third
Discussion, quick exam, problem solving, homework	Theory	Aquifers -Aquifers classification: (confined, unconfined and leaky)	Learn Aquifers	٣	Fourth
Discussion, quick exam, problem solving, homework	Theory	Aquifer Parameters: (porosity, recharge and discharge, hydraulic conuctivity, transmissivity, storativity, specific yield) - Anisotropy and heterogeneity	Aquifers propeties	٣	Fifth
Discussion, quick exam, problem solving, homework	Theory	Groundwater flow - Steady state and unsteady state flow	Groundwater movment	٣	Sixth
Discussion, quick exam, problem solving, homework	Theory	**Mid-term Exam**	Exam	٣	Seventh
Discussion, quick exam, problem solving, homework	Theory	-Driving forces of groundwater flow - -principles laws of groundwater flow (Darcy's law)	Learn Darcy's law	٣	Eighth
Discussion, quick exam, problem solving, homework	Theory	Groundwater Resources Development -Exploration -Evaluation -Exploitation	Groundwater dorces	٣	Ninth
Discussion, quick exam, problem solving, homework	Theory	Wells -Well Drilling Methods: - Methods of Drilling Shallow Wells:	Wells	٣	Tenth
Discussion, quick exam, problem solving, homework	Theory	Well Completion -Placement of casing -Cementing of casing -Placement of well screen	Well's types	٣	Eleventh
Discussion, quick exam, problem solving, homewor	Theory	Requirements for Water Well Design -Limitations of dimensions and diameters of casing piping	Wells requirements	٣	Twelfth

		-Intake area: design of well screen, gravel pack design.			
Discussion, quick exam, problem solving, homework	Theory	Groundwater & Pumping Tests -Steady State Radial Flow to Wells:	Pumps	٣	Thirteenth
Discussion, quick exam, problem solving, homework	Theory	-Unsteady State Radial Flow: Theis`s Method and its application, Jacob`s Methods	Unsteady flow	٣	Fourteenth
Discussion, quick exam, problem solving, homework	Theory	-Discharge calculation from early drawdown data (Sen 1986). -Leaky Aquifers	Discharge measurement	٣	Fifteenth
2nd Course Exam				٣	Sixteenth

12: القبول -	
Fluid mechanics, open channel and Statistical	Prerequisites
١٠	The smallest number of students
٥٠	The largest number of students

13: البنية التحتية -	
6- Foundation Design – Principles and Practice, Third Edition, by Donald P. Coduto, 2014, Pearson Education, Inc. 7- Ground water hydrology	Required readings: Course books Other
Nothing	Special requirements
Nothing	Social services (including, for example, guest lectures, vocational training, and field studies)

Engineering Hydrology

Engineering Hydrology

It is a branch of water resources topics that is concerned with the study and analysis of surface water, parts of the hydrological cycle, and others.

The study of this subject aims to teach and train the student the basics of this specialty and the principles of analysis and design, which he needs for his subsequent studies.

University of Anbar	١- المؤسسة التعليمية
Dams and Water Resources Engineering Dep.	٢- القسم الجامعي / المركز
DWE٤٣٠٢	٣- اسم / رمز المقرر
Bachelor's	٤- البرامج التي يدخل فيها
Attendance	٥- أشكال الحضور المتاحة
First semester/ 2022-2023	٦- الفصل / السنة
٤٥	٧- عدد الساعات الدراسية (الكلي)
18/9/2021	٨- تاريخ إعداد هذا الوصف

٩- أهداف المقرر :

It is concerned with teaching students the basic principles of analyzing and studying the stages of the water cycle in nature (precipitation - flow - evaporation - storage) with the aim of estimating the amount of available water and planning and operating water facilities. Addressing issues related to the water budget, developing hydrological calculation methods, accurately determining water discharges, forecasting future water discharges, and determining the size of reservoirs to meet needs. Drinking, irrigation and drying time.

١٠- مخرجات التعلم وطرائق التعليم والتعلم والتقييم:

أولا: الأهداف المعرفية:

The student must be able to:

5. Preparing and analyzing hydrological data and using them to solve applied problems.
6. Water budget calculation
7. Researching the forms of flow
8. Analysis of hydrological prediction of drainage and water levels

ثانيا: الأهداف المهاراتية الخاصة بالمقرر:

1- Think geometrically to estimate and calculate water resources – .
2- Explains processes such as precipitation, runoff, and total evaporation and their interactions.
3- It works on solving problems such as flood and drought and strategies to prevent them.
4- He uses his practical experience, if any, in comparison with the theoretical results of analysis, design and creation the solution

أ- طرائق التعليم والتعلم :

14- Providing students with the basics and topics related to previous educational outcomes and the skills to solve practical problems through presentation, lecture, or conducting experiments.
15- Solving a group of practical and applied examples by the subject teacher.
16- Through discussion, students participate in solving some practical problems.
17- Daily surprise and continuous weekly tests.
18- Directing students to some websites to benefit from them.

ب- طرائق التقييم :

14- Evaluating students individually by giving them an opportunity to participate in the class by answering questions.
15- Evaluating students collectively through daily exams with practical and theoretical questions.
16- Evaluating students collectively by giving extracurricular assignments, such as writing reports or doing assignments.
17- Permanent monthly exams for students to evaluate their general performance and understanding of the subject.
18- Final exams for the first and second round.

ج- مهارات التفكير :

8- Knowing and studying how to analyze the factors affecting surface runoff and transforming them into design principles and linking them to reality to direct the student's thought towards practical life.
9- Analyzing the results of solving problems and comparing them mentally with reality and the extent of their conformity with the actual design values.
10- Analyzing the results obtained by the student by conducting practical reports and determining the extent of their reality.

د- طرائق التعليم والتعلم :

16- Using modern means to present the scientific and theoretical aspect, such as Data Show devices, to attract attention and attract students so that the idea reaches the student better.
17- Giving students extra-curricular assignments that require them to exert skills and self-explanations in experimental ways.
18- Interrogating students through discussion sessions by asking intellectual questions such as: (how, why, when, where, which) for specific topics.
19- Using the method of brainstorming and mental nutrition in order to activate the accumulated experiences of students by linking the subjects taken in the pre-university educational levels and linking them to the new ones.
20- Providing students with practical skills by linking their studies to practical reality.

ه- طرائق التقييم :

يتم التقييم على أساس:

-١ Monthly exams ٢٠٪ :
-٢Daily exams ١٠٪ :
-٣HomeWorks % ٥ :
-٤Attendance % ٥ :
-٥ Final exams% ٦٠ :

و - المهارات العامة والمنقولة (المهارات الأخرى المتعلقة بقابلية التوظيف والتطور الشخصي):

13- Enabling students to master the subject in its applied and cognitive aspects.
14- Developing the student's ability to analyze information and interpret the data he obtained by linking the topic he learned with practical reality.
15- Enabling the student to use the specific and general equations of the subject and how to benefit from them in analyzing issues and extracting results accurately.
16- Enabling the student to conduct a field survey to identify the problems facing the engineer in the field.

١١- بنية المقرر:

Evaluation method	Teaching method	unit/course or subject	learning outcomes	Hours	Week
Discussion, quick exam, problem solving, homework	Theory	Introduction	General Introduction	٣	First
Discussion, quick exam, problem solving, homework	Theory	Hydrologic cycle, return periods and water balance	Learn Hydrology properties	٣	Second
Discussion, quick exam, problem solving, homework	Theory	Precipitation, types of precipitation and stream flow measurements	Learn Hydrology properties	٣	Third
Discussion, quick exam, problem solving, homework	Theory	Estimation of missed data, checking data consistency & Rainfall frequency analysis	Data Analysis	٣	Fourth
Discussion, quick exam, problem solving, homework	Theory	Theory of frequency analysis for design storms and design floods	Analysis and Design	٣	Fifth
Discussion, quick exam, problem solving, homework	Theory	Measurement of evaporation and estimation of potential evaporation	Analysis and Design	٣	Sixth
Discussion, quick exam, problem solving, homework	Theory	**Mid-term Exam**	Exam	٣	Seventh
Discussion, quick exam, problem solving, homework	Theory	Infiltration, Factors affecting infiltration, Measurement and estimation of infiltration process	Properties measurements	٣	Eighth
Discussion, quick exam, problem solving, homework	Theory	Hydrographs, Introduction and Unit Hydrographs	Properties measurements	٣	Ninth
Discussion, quick exam, problem solving, homework	Theory	Hydrograph application, Time Area Models and Synthetic Unit Hydrographs	Hydrology Application	٣	Tenth
Discussion, quick exam, problem solving, homework	Theory	Channel Intake and Flood routing: channel & reservoir routing	Analysis and Design	٣	Eleventh
Discussion, quick exam, problem solving, homewor	Theory	Introduction to groundwater and Movement of ground water and Transmissibility	General Introduction	٣	Twelfth
Discussion, quick exam, problem solving, homework	Theory	Applications of binominal distribution for defining the return period in engineering design	Hydrology application	٣	Thirteenth

Discussion, quick exam, problem solving, homework	Theory	Normal distribution and its application and relationship to hydraulic designs	Statistical application	٣	Fourteenth
Discussion, quick exam, problem solving, homework	Theory	Statistical distributions and their applications in flood analysis	Statistical application	٣	Fifteenth
2nd Course Exam				٣	Sixteenth

١٣- القبول :	
Fluid mechanics, open channel and Statistical	Prerequisites
١٠	The smallest number of students
٥٠	The largest number of students

١٢- البنية التحتية :	
8- Warren vissman , Introduction to hydrology, 5th ed, 2003. 9- Ven Te Chow, Applied hydrology. 10- Em. Wilson, Engineering hydrology.	Required readings: □ Course books □ Other
Nothing	Special requirements
Nothing	Social services (including, for example, guest lectures, vocational training, and field studies)