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

Academic Program and Course Description Guide

2024-2025

Introduction:

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

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

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

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

Concepts and terminology:

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

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

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

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

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

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

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

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

Academic Program Specification Form for the Academic Year 2024-2025

University Name: Al-Nahrain University
Faculty: Engineering
Scientific Department: Department of Biomedical Engineering
Academic or Professional Program Name: Biomedical Engineering
Final Certificate Name: Biomedical Engineering
Academic System: Semesters (1st Semester, 2nd Semester)
Description Preparation Date: 12/09/2024
File Completion Date: 1 / 03/ 2025

Signature:

Head of Department Name:

Prof. Dr. Auns Q. Al-Neami

Date: 1 / 3/ 2025

Signature:

Scientific Associate Name:

Prof. Dr. Naseer A. Al-Haboubi

Date: 1 / 3 / 2025

The file is checked by:
Department of Quality Assurance and **University Performance**
Director of Quality Department Assurance and **University Performance**
Date: 1 / 3 / 2025

Signature:

Asst. Prof. Dr. Yasser I. Abdulaziz

Approval of the Dean

Prof. Dr. Ayad M. Takkalah

1. Program Vision

We look forward to establishing a department with both local and global significance in the fields of biomedical engineering and medical sciences engineering by the year 2020. This will be achieved through the exchange of knowledge, integration of curricula, structural integrity, and competitiveness in the comprehensive development of the department at all levels and dimensions. Additionally, we aim to enhance current participation in biomedical engineering research with reputable universities, conferences, and global journals in this field, all within the framework of the cultural, scientific, and ethical values that prevail in the society, both present and future. This will contribute to achieving sustainable development on all fronts.

2. Program Mission

In Biomedical Engineering, the program is capable of managing the biomedical engineering portfolio and efficiently dealing with all aspects related to systems, devices, and equipment specific to medical engineering and biomedical engineering, as well as their applications, management, and use effectively and efficiently to ensure integrated quality in medical engineering services and collaboration with medical staff in hospitals and healthcare centers.

The research and graduate study projects in the department aim to focus on conducting modern practical research to ensure achieving a high level of both theoretical and practical research capabilities in this field, contributing to the development of the country.

3. Program Objectives

A. Graduating engineering professionals in the field of biomedical engineering who are capable of facing all the challenges and obstacles encountered during their work in industrial and technological sectors by equipping them with all the necessary information, fundamentals, and scientific facts required in their field of work in biomedical engineering.

B. Preparing technical and engineering personnel in the field of biomedical engineering to stay informed about the latest scientific and technological developments and to strive to benefit from them in serving the community, while also enhancing students' teamwork skills.

C. Ensuring that graduates are capable of applying engineering principles to solve problems and obstacles encountered in their work, in addition to understanding the philosophy of engineering design within their specialization.

4. Program Accreditation

There is none.

5. Other external influences

There is none.

6. Program Structure

Program Structure	Number of Courses	Credit hours	Percentage	Reviews*
Institution Requirements	5	15		
College Requirements	8	39		
Department Requirements	41	210		

Summer Training				**2 hours (2 months)**
Other	**9**	**38**		

* This can include notes whether the course is basic or optional.

7. Program Description

Year/Level	Course Code	Course Name	Credit Hours	
			theoretical	practical
1st	UREQ110	Human Rights	1	
	UREQ111	Computer Fundamentals and Programming I	1	2
	MATH110	Mathematics I	3	
	CREQ110	Engineering Drawings	1	2
	CREQ111	Workshop Technology		3
	PHYS110	Physics	2	2
	MDER110	Chemistry	2	2
	MDER111	Electrical Circuits I	2	2
	UREQ120	Arabic Language I	1	
	UREQ121	English Language I	2	
	MATH120	Mathematics II	3	
	CREQ120	Engineering Graphics	1	2
	MDER120	Biophysics	2	
	MDER121	Biochemistry	2	2
	MDER122	Electrical Circuits II	3	2
	MDER123	Computer Programming	1	2
2nd	UREQ210	English II	2	
	UREQ211	Principles of Management	1	
	UREQ212	Arabic Language II	1	
	UREQ213	Computer Fundamentals and Programming II	1	2
	MATH210	Mathematics III	3	
	MDER210	Engineering Mechanics I	3	
	MDER211	Material Science	2	2
	MDER212	Electronics I	2	3
	MDER213	Cell Biology	2	
	UREQ220	Democracy	1	

	MATH220	Mathematics IV	3	
	MDER220	Engineering Mechanics II	3	
	MDER221	Electronics II	2	3
	MDER222	Electromagnetic fields	2	
	MDER223	Limbs Anatomy	2	2
	MDER224	Electrical Networks	2	
	MDER225	Optical System Design	2	
	MDER226	Introduction to BME	1	
3rd	MDER310	Engineering Analysis	3	
	MDER311	Mechanics of Materials I	2	
	MDER312	Trunk Anatomy	2	2
	MDER313	Physiology I	2	3
	MDER314	Histology	2	2
	MDER315	Electronics III	2	
	MDER316	Medical Equipment I	2	2
	MDER317	Experimental Design	2	2
	UREQ320	English III	2	
	CREQ320	Engineering Statistics	2	
	MDER320	Numerical Analysis	2	2
	MDER321	Mechanics of Materials II	2	2
	MDER322	Head & Neck Anatomy	2	2
	MDER323	Physiology II	2	3
	MDER324	Medical Equipment II	2	
	MDER325	Bone Injury and Fractures	2	
4th	UREQ410	English IV	2	
	MDER410	Biomechanics I	2	3
	MDER411	Biomaterials I	2	3
	MDER412	Communications	2	3
	MDER413	Medical Instrumentation	2	2
	MDER414	Digital Electronics I	2	2
	MDER415	Thermo-Fluid Mechanics I	2	
	MDER416	Pathology	2	
	MDER420	Biomechanics II	2	3
	MDER421	Biomaterials II	2	
	MDER422	Telemedicine	2	
	MDER423	Analytical Mechanics	2	
	MDER424	Therapeutic Instrumentation	2	2
	MDER425	Digital Electronics II	2	3
	MDER426	Thermo-Fluid Mechanics II	2	
	MDER427	Image Processing	2	2

5th	UREQ510	Professional Ethics	1	
	CREQ510	Project		6
	MDER510	Control I	2	
	MDER511	Diagnostic Instrumentation	2	2
	MDER512	Hospital System & Design	2	
	MDER513	Microprocessor	2	3
	MDER514	Neural Networks	2	
	MDER515	Elective I	2	
	MDER516	Elective II	2	
	CREQ520	Engineering Management	1	
	CREQ521	Project		6
	MDER520	Control II	2	3
	MDER521	Modern Medical Equipments	2	
	MDER522	Biotribology	2	
	MDER523	Biomedical Sensors	2	
	MDER524	Elective III	2	
	MDER525	Elective IV	2	2

8. Expected learning outcomes of the program

Knowledge

A.1 Knowledge of the fundamental principles of engineering and biomedical sciences necessary to understand advanced topics in biomedical engineering.

A.2 The ability to use techniques, skills, and tools useful for designing biomedical projects, experimental studies, and engineering practices.

A.3 Acquiring the essential skills that qualify them to prepare the requirements for designing modern hospitals, healthcare centers, and other health units.

A.4 Understanding the professional and ethical responsibilities that fall on the biomedical engineer.

Skills

The student should be familiar with the most important computational and mathematical software used in the field of design and solving engineering problems, along with the fundamentals of their theoretical applications.

The ability to understand and design engineering solutions in biomedical engineering fields, including molecular, cellular, and nanoscale engineering; biomaterials and tissue engineering; medical devices and systems engineering; biomechanical engineering, rehabilitation engineering; biomedical optics;

physiological system modeling; hospital and healthcare center design; computational biomedical engineering; and biomedical imaging. The ability to keep up with scientific developments in the field of biomedical engineering. The ability to prepare engineering designs and develop medical devices, systems, and equipment.
Ethics
Developing students' abilities to share ideas.
Expressing thoughts and feelings about life matters, including the subject matter.

9. Teaching and Learning Strategies

1. Scientific visits
2. Laboratory experiments
3. Scientific seminars
4. Graduation projects
5. Lectures of the cultural quality program for students

10. Evaluation methods

A. Evaluation of laboratory reports and reports of scientific visits

B. Committees for discussing graduation research projects

11. Faculty

Faculty Members

Academic Rank	Specialization		Special Requirements/Skills (if applicable)		Number of the teaching staff	
	General	Special			Staff	Lecturer
Prof. Dr. Nabil Kazem Abdul-Sahib	Mechanical Engineering	Biomaterials			Staff	

Prof. Dr. Jamal Abdul-Jabbar Hassan Al-Tayef	Physics Science	Applied Medical Physics			**Staff**	
Asst. Prof. Dr. Sadiq Jaafar Abbas Abdul-Majid	Mechanical Engineering	Biomechanics			**Staff**	
Asst. Prof. Dr. Auns Qusai Hashim Abdul-Aziz	Electrical Engineering	Medical Systems Design and Signal Processing			**Staff**	
Asst. Prof. Dr. Sufyan Munther Saleh Hameed	Statistics and Information Technology	Operations Research Planning (Regional)			**Staff**	
Asst. Prof. Dr. Lujain Qudari Ibrahim Saleh	Materials Engineering	Materials Science and Nanotechnology			**Staff**	
Asst. Prof. Dr. Hadeel Qasim Wadi	Medical Engineering	Medical Engineering			**Staff**	
Asst. Prof. Dr. Ahmed Faiq Hussein Ali	Electrical Engineering	Computer Engineering and Software Systems			**Staff**	
Asst. Prof. Dr. Rana Ibrahim Mahmoud Hassan	Life Sciences	Zoology			**Staff**	
Asst. Prof. Dr. Hassanin Ali Laftha	Medical Engineering	Medical Engineering			**Staff**	
Asst. Prof. Dr. Aseel Mohammad Ali	Medical Engineering	Medical Engineering			**Staff**	

Dr. Ali Mahdi Muftan	Civil Engineering	Construction Engineering			**Staff**	
Dr. Iman Ghadban Khalil	Pathology	Pathological Immunology			**Staff**	
Dr. Salman Majid Salman	Electronics and Communications Engineering	Microwave Electronics and Communications			**Staff**	
Dr. Samar Ali Jaber Ali	Medical Engineering	Medical Engineering			**Staff**	
Dr. Dunya Tahseen Naama Mahdi	Chemistry Science	Clinical Biochemical Chemistry			**Staff**	
Dr. Mays Adi Abdul-Rasool Jaafar	Medical Engineering	Medical Engineering			**Staff**	
Dr. Jassim Mohammad Sahen Hassan	Electrical Engineering	Electronic Engineering			**Staff**	
Dr. Alaa Ayd Jaber	Medical Engineering	Medical Engineering			**Staff**	
Dr. Mona Mustafa Kareem	Medical Engineering	Medical Engineering			**Staff**	
Dr. Hussein Abdul-Jaber	Medical Engineering	Medical Engineering			**Staff**	
Dr. Basma Abdul-Sahib Fayhan	Medical Engineering	Medical Engineering			**Staff**	

Asst. Lect. Qais Ahmed Habash Salman	Medical Engineering	Medical Engineering			**Staff**	
Asst. Lect. Reem Shaker Mahmoud Jarad	Medical Engineering	Medical Engineering			**Staff**	
Asst. Lect. Noor Ali Sadiq Jaafar	Medical Engineering	Medical Engineering			**Staff**	
Asst. Lect. Faten Emad Ali Ahmed	Medical Engineering	Biomedical Engineering			**Staff**	
Asst. Lect. Hamza Abbas Fadhil Ibrahim	Biomedical Engineering	Biomedical Engineering			**Staff**	
Asst. Lect. Zaid Mustafa Khudair	Electronics and Communications Engineering	Electronics and Communications Engineering			**Staff**	
Asst. Lect. Ahmed Lateef Khudaraham	Electronics and Communications Engineering	Electronics and Communications Engineering			**Staff**	
Asst. Lect. Duaa Nawfal Hazim	Electronics and Communications Engineering	Electronics and Communications Engineering			**Staff**	
Asst. Lect. Abdullah Nasser Ibrahim	Electrical Engineering	Communications and Electronics Engineering			**Staff**	
Asst. Lect. Fatima Ibrahim Yasser	Electrical Engineering	Communications and Electronics Engineering			**Staff**	

Asst. Lect. Arkan Saad Mohammad	Materials Engineering	Materials Engineering			**Staff**	
Asst. Lect. Enas Shehab Ahmed	Veterinary Medicine	Anatomy and Tissues			**Staff**	

Professional Development

Mentoring new faculty members

Welcome and Introduction to the Institution:

- Provide an overview of the institution's vision, mission, and strategic goals.
- Introduce new members to the academic departments and various administrative units.

Academic Aspects:

- Explain teaching and learning policies, such as curriculum planning and student assessment.
- Clarify the role of faculty members in research and supervising projects and theses.

Systems and Regulations:

- Explain workplace laws, such as attendance requirements, professional conduct, and promotion policies.
- Describe the mechanisms for using institutional resources, such as libraries, laboratories, and online platforms.

Technologies and Skills:

- Provide training on using electronic learning systems (such as Learning Management Systems).
- Guide them on time management and developing teaching skills.

Communication and Support:

- Organize regular meetings with colleagues and academic leaders to exchange experiences.
- Assign an academic advisor to each new member to assist them during the adjustment period.

Field Visits and Orientation Tours:

- Conduct campus tours, including laboratories and research centers, to showcase the available facilities.

Professional development of faculty members

Improving Academic Performance: Developing teaching skills and knowledge transfer methods.

Enhancing Scientific Research: Enabling faculty members to produce innovative and impactful research.

Adapting to Modern Technologies: Integrating digital and technological tools into education.

Enhancing Academic Leadership: Preparing faculty members to take on senior administrative and academic positions.

Achieving Student Satisfaction: Improving teaching methods to meet the diverse needs of students.

12. Acceptance Criterion

Admission Requirements for the College:

A. Admission conditions for students shall be in accordance with the regulations issued by the Ministry of Higher Education and Scientific Research (Central Admission).

B. The student must be medically fit for the specialization they are applying to.

Admission Requirements for the Academic Department:

A. The student must select their preferences from multiple options, ranked in order of priority.

B. The required high school grade average for admission.

C. The department's capacity to accommodate students.

13. The most important sources of information about the program

A. Accredited sources in global universities

B. Local trends

C. Market needs

D. Studies and surveys

E. Specialized seminars and workshops with beneficiary organizations

14. Program Development Plan
Improving Education Quality: Updating curricula to align with the latest academic standards. Aligning with Market Needs: Designing programs that prepare graduates with skills and knowledge that meet market requirements. Enhancing Scientific Research: Supporting research activities and directing them toward current issues and challenges. Supporting Innovation and Technology: Integrating modern educational technologies to develop an interactive learning environment. Achieving Academic Accreditation: Ensuring the program complies with national and international accreditation standards.

Program Skills Outline															
				Required program Learning outcomes											
Year/Level	Course Code	Course Name	Basic or optional	Knowledge				Skills				Ethics			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4
1st	UREQ110	Human Rights	Basic	√											
	UREQ111	Computer Fundamentals and Programming I	Basic	√				√							
		Mathematics I	Basic	√	√										
	MATH110	Engineering Drawings	Basic	√	√	√					√				
	CREQ110	Workshop Technology	Basic	√	√								√		√
	CREQ111	Physics	Basic	√	√										
	PHYS110	Chemistry	Basic	√	√										
	MDER110	Electrical Circuits I	Basic	√	√				√	√	√	√	√		√
	MDER111	Arabic Language I	Basic	√											

	UREQ120	English Language I	**Basic**	√												
	UREQ121	Mathematics II	**Basic**	√	√	√		√	√							
	MATH120	Engineering Graphics	**Basic**	√	√	√		√	√							
	CREQ120	Biophysics	**Basic**	√	√	√			√	√	√	√	√	√	√	√
	MDER120	Biochemistry	**Basic**	√	√				√	√	√		√			
	MDER121	Electrical Circuits II	**Basic**	√	√				√	√	√	√	√	√	√	√
	MDER122	Computer Programming	**Basic**	√				√						√		
2nd	MDER123	English II	**Basic**	√												
	UREQ210	Principles of Management	**Basic**	√									√		√	
	UREQ211	Arabic Language II	**Basic**	√												
	UREQ212	Computer Fundamentals and Programming II	**Basic**	√				√						√		
	UREQ213	Mathematics III	**Basic**	√	√	√		√	√							
		Engineering Mechanics I	**Basic**	√	√			√	√	√	√	√		√	√	

	MATH210	Material Science	**Basic**	√	√	√	√	√	√	√		√	√	√	√
	MDER210	Electronics I	**Basic**	√	√	√		√	√	√	√	√	√	√	√
	MDER211	Cell Biology	**Basic**	√	√				√	√		√	√	√	
	MDER212	Democracy	**Basic**	√											
	MDER213	Mathematics IV	**Basic**	√	√			√	√	√	√	√			√
	UREQ220	Engineering Mechanics II	**Basic**	√	√			√	√	√	√	√		√	√
	MATH220	Electronics II	**Basic**	√	√	√		√	√	√	√	√	√	√	√
	MDER220	Electromagnetic fields	**Basic**	√	√			√	√	√	√	√		√	√
	MDER221	Limbs Anatomy	**Basic**	√			√			√	√				
	MDER222	Electrical Networks	**Basic**	√	√			√	√	√	√	√		√	√
	MDER223	Optical System Design	**Basic**	√	√			√	√	√	√	√	√	√	√
	MDER224	Introduction to BME	**Basic**	√			√		√	√					
3rd	MDER225	Engineering Analysis	**Basic**	√	√			√	√	√	√	√			√
	MDER226	Mechanics of Materials I	**Basic**	√	√			√	√	√	√	√		√	√

	MDER310	Trunk Anatomy	**Basic**	√			√		√	√					
	MDER311	Physiology I	**Basic**	√	√		√		√	√		√	√	√	
	MDER312	Histology	**Basic**	√	√				√	√		√	√	√	
	MDER313	Electronics III	**Basic**	√	√	√		√	√	√	√	√	√	√	√
	MDER314	Medical Equipment I	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
	MDER315	Experimental Design	**Basic**	√	√			√	√	√	√	√		√	√
	MDER316	English III	**Basic**	√											
	MDER317	Engineering Statistics	**Basic**	√	√			√	√	√	√	√			√
	UREQ320	Numerical Analysis	**Basic**	√	√			√	√	√	√	√			√
	CREQ320	Mechanics of Materials II	**Basic**	√	√			√	√	√	√	√		√	√
	MDER320	Head & Neck Anatomy	**Basic**	√			√		√	√					
	MDER321	Physiology II	**Basic**	√	√		√		√	√		√	√	√	
	MDER322	Medical Equipment II	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
	MDER323	Bone Injury and Fractures	**Basic**	√			√		√	√			√	√	
	MDER324	English IV	**Basic**	√											

4th	MDER325	Biomechanics I	**Basic**	√	√	√	√	√	√	√	√	√	√	√	
	UREQ410	Biomaterials I	**Basic**	√	√		√		√	√	√	√	√	√	√
	MDER410	Communications	**Basic**	√	√	√		√	√	√	√	√	√	√	√
	MDER411	Medical Instrumentation	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
	MDER412	Digital Electronics I	**Basic**	√	√	√		√	√	√	√	√	√	√	√
	MDER413	Thermo-Fluid Mechanics I	**Basic**	√	√			√	√	√	√	√		√	√
	MDER414	Pathology	**Basic**	√	√	√	√	√	√	√	√	√	√	√	
	MDER415	Biomechanics II	**Basic**	√	√	√	√	√	√	√	√	√	√	√	
	MDER416	Biomaterials II	**Basic**	√	√		√		√	√	√	√	√	√	√
	MDER420	Telemedicine	**Basic**	√	√	√		√	√	√	√	√	√		√
	MDER421	Analytical Mechanics	**Basic**	√	√			√	√	√	√	√		√	√
	MDER422	Therapeutic Instrumentation	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√

	MDER423	Digital Electronics II	**Basic**	√	√	√		√	√	√	√	√	√	√	√
	MDER424	Thermo-Fluid Mechanics II	**Basic**	√	√			√	√	√	√	√		√	√
	MDER425	Image Processing	**Basic**	√		√	√	√	√	√	√	√	√	√	√
5th	MDER426	Professional Ethics	**Basic**				√						√		
	MDER427	Project	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
	UREQ510	Control I	**Basic**	√		√	√	√	√	√	√	√	√	√	√
	CREQ510	Diagnostic Instrumentation	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
	MDER510	Hospital System & Design	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
	MDER511	Microprocessor	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
	MDER512	Neural Networks	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
	MDER513	Elective I	**Optional**	√	√	√	√	√	√	√	√	√	√	√	√
	MDER514	Elective II	**Optional**	√	√	√	√	√	√	√	√	√	√	√	√

	MDER515	Engineering Management	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
	MDER516	Project	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
	CREQ520	Control II	**Basic**	√		√	√	√	√	√	√	√	√	√	√
	CREQ521	Modern Medical Equipment	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
	MDER520	Biotribology	**Basic**	√	√			√	√	√	√	√	√	√	√
	MDER521	Biomedical Sensors	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
	MDER522	Elective III	**Optional**	√	√	√	√	√	√	√	√	√	√	√	√
	MDER523	Elective IV	**Optional**	√	√	√	√	√	√	√	√	√	√	√	√
	MDER524	Elective III	**Optional**												
	MDER525	Elective IV	**Optional**												

- **Please tick the boxes corresponding to the individual program learning outcomes under evaluation.**

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Electrical Circuits II**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MDER120**				
ECTS Credits	**7**				
SWL (hr/sem)	**175**				
Module Level	1		**Semester of Delivery**	2	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Dr. Jassim Mohammed Sahan		**e-mail**	jassim.m.sahan@nahrainuniv.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	PhD	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01/06/2024		**Version Number**	1.0	

Module description

The AC Electrical Circuits course module covers the basics of alternating current (AC) circuits. You'll learn about AC waveforms, circuit analysis techniques, components like capacitors and inductors, power calculations, resonance, and filters. This module provides essential knowledge for understanding and working with AC circuits in fields such as electrical engineering and electronics.

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Electrical Circuits I	**Semester**	1
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To develop problem solving skills and understanding of circuit theory through the application of techniques. 2. To understand voltage, current and power from a given circuit. 3. This course deals with the basic concept of electrical circuits. 4. This is the basic subject for all electrical and electronic circuits. 5. To understand Kirchhoff's current and voltage Laws problems. 6. To perform mesh and Nodal analysis.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Recognize how electricity works in electrical circuits. 2. List the various terms associated with electrical circuits. 3. Summarize what is meant by a basic electric circuit. 4. Discuss the reaction and involvement of atoms in electric circuits. 5. Describe electrical power, charge, and current. 6. Define Ohm's law, and two Kirchoff's laws 7. Identify the basic circuit elements and their applications. 8. Discuss the operations of sinusoid and phasors in an electric circuit. 9. Discuss the various properties of resistors, capacitors, and inductors. 10. Explain and Apply all methods used in AC circuit analysis. 11. Identify the capacitor and inductor phasor relationship with respect to voltage and current.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. • Alternating Waveforms (AC Waveform). [4 hrs] • Complex Numbers & Phasors. [2 hrs] • The response of the basic elements R, L, and C to a sinusoidal voltage or current. [4 hrs] • Power Forms in AC Circuits. [2 hrs] • Series, Parallel, and Series-Parallel Circuits. [6 hrs] • Theorems: Norton, Nodal, Mesh, Source Transformation, Maximum Power Transfer, Thevenin and Superposition. [14 hrs] • Delta-Star Networks. [2 hrs] • Resonance In Electric Circuits [6 hrs] • Revision problem classes [5 hrs] Laboratory [45 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Assessment is based on hand-in assignments, written exam, Case study, Quizzes, seminars, Practical testing and Online testing.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	82	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	175		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	3	15% (5)	Continuous	LO # 1-11
	Assignments	4	8% (2)	Continuous	LO # 1-11
	Projects / Lab.	3	12% (4)	Continuous	
	Reports	5	5% (1)	Continuous	LO # 1-11
Summative assessment	**Midterm Exam**	3 hr	10% (10)	8,15	LO # 1 and 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 - Alternating Waveforms (AC Waveform)
Week 2	Alternating Waveforms (AC Waveform)
Week 3	Complex Numbers & Phasors
Week 4	The response of the basic elements R, L, and C to a sinusoidal voltage or current
Week 5	Series, Parallel, and Power Forms in AC Circuits

Week 6	Series-Parallel AC Circuits
Week 7	Source Transformation and Superposition Theorem
Week 8	1st mid exam
Week 9	Mesh Theorem and Nodal Theorem
Week 10	Thevenin Theorem and Maximum Power Transfer Theorem
Week 11	Norton Theorem
Week 12	Delta-Star Networks
Week 13	Resonance In Electric Circuits
Week 14	Resonance In Electric Circuits
Week 15	2nd mid exam
Week 16	**Final exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction to AC Electrical Circuits Components and Devices
Week 2	Lab 2: R L C Series Circuits
Week 3	Lab 3: R L C Series Circuits
Week 4	Lab 4: RLC Parallel Circuits
Week 5	Lab 5: RLC Parallel Circuits
Week 6	Lab 6: Resonance in Series AC Circuits
Week 7	Lab 7: Resonance in Parallel AC Circuits

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**

Required Texts	Lectures	Yes
Recommended Texts	Fundamentals of Electric Circuits, C.K. Alexander and M.N.O Sadiku, McGraw-Hill Education	Yes
Websites	https://www.coursera.org/browse/physical-science-and-engineering/electrical-engineering	

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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Physics			**Module Delivery**	
Module Type	Basic			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	**PHYS110**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	1		**Semester of Delivery**	2	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Asst. Prof.Dr.Auns Q.A-Neami, Dr. Safa Layth Kailan		**e-mail**	auns.q.hashim@nahrainuniv.edu.iq, Safa.layth@nahrainuniv.edu.iq	
Module Leader's Acad. Title	Lecturer		**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	01/06/2024		**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 أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. Develop Problem-Solving and Theoretical Understanding: Apply physics principles and techniques to solve problems and deepen understanding of fundamental theories. 2. Master Newtonian Mechanics: Understand and apply Newton's laws to analyze the motion of simple systems. 3. Explore Electromagnetic Waves and Optics: Gain knowledge of electromagnetic waves, optical systems, Huygens' principle, interference, diffraction, polarization, and optical instruments (camera, eye, compound microscope), with practical applications in medicine. 4. Understand Sound and Its Applications: Study the basics of sound, wave production, properties, Doppler effect, shock waves, and medical applications (stethoscope, ultrasound). 5. Explore Fluid Mechanics: Understand pressure, density, Pascal's principle, hydraulic systems, Archimedes' principle, and blood pressure measurement. 6. Study Thermodynamics and Modern Physics: Learn about temperature, heat, heat flow, thermal conductivity, real gases, transport phenomena, and optionally, modern physics topics (atomic physics, X-rays, radioactivity, nuclear physics, and medical applications).
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Mathematical Foundations of Physics: Develop a comprehensive understanding of scalar and vector products and their applications in various physical concepts. 2. Classical Mechanics and Probability: Explore the fundamental principles of probability theory. Study Newton's laws of motion and apply them to analyze the dynamics of simple systems. 3. Optics and Electromagnetic Waves: Introduce key concepts in optics, including electromagnetic waves, Huygens' principle, eyepieces, interference, diffraction, polarization, and optical instruments. 4. Acoustics and Sound: Define the basic concepts of sound, its production, and general properties. Discuss the Doppler effect, shock waves, and the medical applications of ultrasound. 5. Fluid Mechanics and Pressure: Explore the relationships between pressure, density, and fluid behavior. Study Pascal's principle, hydraulic systems, Archimedes' principle, and blood pressure measurement. 6. Modern Physics: Introduce atomic physics, X-rays, radioactivity, and nuclear physics. Discuss the medical applications of nuclear physics.

Indicative Contents المحتويات الإرشادية	**Indicative content includes the following.** This course provides a comprehensive introduction to physics, covering a wide range of topics. Key areas include: Mechanics: Forces, motion, and the laws of motion. Electromagnetism: Electromagnetic waves, light, and optics. Sound: Sound waves, properties, and applications. Fluids: Pressure, density, and fluid dynamics. Thermodynamics: Temperature, heat, and heat transfer. Modern Physics: Atomic physics, X-rays, radioactivity, and nuclear physics. The course will delve into the fundamental principles of these topics and their applications in various fields, including medicine and engineering.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Assessment is based on hand-in assignments, written exam, Case study, Quizzes, seminars, Practical testing and Online testing.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	57	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	Continuous	LO #1, 2, 6 and 7
	Assignments/ Lab.	5	10% (10)	Continuous	LO # 3, 5, 6 and 7
	Seminar.	1	10% (10)	15	
	Report	5	10% (10)	13	LO # 3, 5 and 7

Summative assessment	**Midterm Exam**	3 hr	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 to Physics
Week 2	Motion on a straight line, measurements, velocity, acceleration, falling objects.
Week 3	Motion in two dimensions, vectors, velocity and acceleration in 2D.
Week 4	Newton's laws of motion, force, weight, density, equilibrium, friction.
Week 5	Statics, torque, equilibrium of rigid bodies, center of gravity, stability, levers.
Week 6	Work and energy, work, kinetic energy, potential energy, power.
Week 7	Mid-term Exam
Week 8	Mechanics of non-viscous fluids, Archimedes' principle, continuity equation, Bernoulli's equation.
Week 9	Viscous fluids, viscosity, flow in the circulatory system, flow resistance.
Week 10	Nuclear physics, radioactivity, half-life.
Week 11	Advanced topics in radiation physics, such as radiation therapy or nuclear medicine.
Week 12	Mid-term Exam
Week 13	Ionizing radiation, interaction of radiation with matter, radiation units
Week 14	Mirrors, lenses, and imaging systems, power of a lens, the human eye, optical defects.
Week 15	Lab final
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Forces
Week 2	Lab 2: Refractive index of glass, by real and apparent depth using a traveling microscope,

Week 3	Lab 3: Acceleration of free fall by mean of the Simple pendulum
Week 4	Lab 4: The surface tension of water by the pull of microscope slide.
Week 5	Lab 5: Refractive index of water, by real and apparent depth using a traveling microscope.
Week 6	Lab 6: Determination of (g) by an oscillating liquid in to a U-tube .
Week 7	Lab 7: Spiral spring

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	College Physics	Yes
Recommended Texts	Physics in Biology and Medicine	Yes
Websites	https://archive.org/details/medicalphysicsph0000came/mode/1up https://www.scribd.com/document/110659487/Medical-Physics-and-Biomedical-Engineering	

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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Computer Fundamentals and Programming II**			**Module Delivery**	
Module Type	**Basic learning activities**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**CREQ121**				
ECTS Credits	**3**				
SWL (hr/sem)	**75**				
Module Level	UGI		**Semester of Delivery**	2	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Qais Ahmed Habash		**e-mail**	qais.a.habash@nahrainuniv.edu.iq	
Module Leader's Acad. Title	Assistant Lecturer		**Module Leader's Qualification**	Master	
Module Tutor	-		**e-mail**		
Peer Reviewer Name	-		**e-mail**		
Scientific Committee Approval Date	24/08/2024		**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 أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. **Computer Troubleshooting :To develop students' practical ability to diagnose and resolve common computer hardware and software issues, enabling them to maintain system functionality and efficiency.** 2. . 3. **Introduction to AI: To provide students with a foundational understanding of Artificial Intelligence (AI), covering its core concepts, historical development, and primary subfields to build a strong theoretical base.** 4. **Application of AI :To enable students to identify and analyze diverse real-world applications of AI across various industries, showcasing its transformative impact and practical utility.** 5. **Tools of AI :To familiarize students with the essential software tools and platforms used in AI development, equipping them with the knowledge to select and utilize appropriate resources for AI projects.** 6. **Aim: Ethical AI :To foster critical thinking and awareness regarding the ethical implications of AI technologies, prompting students to consider issues such as bias, privacy, and accountability in AI development and deployment.** 7. **Aim: AI in Smartphones : To explore the integration and functionality of Artificial Intelligence within smartphone technology, helping students understand how AI enhances daily mobile user experiences.** 8. **Future of AI :To stimulate foresight and discussion on the potential future trajectory and societal impact of Artificial Intelligence, encouraging students to contemplate emerging trends and long-term implications.**
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	**Knowledge and Understanding** 1. **Covers theoretical foundations of computer systems: hardware, operating systems, networking basics.** 2. **Delves into AI definitions, history, and key subfields (machine learning, deep learning, NLP).** 3. **Explores AI applications across various domains and common AI tools/platforms.** 4. **Examines philosophical and societal debates on AI ethics.** 5. **Investigates AI integration in smartphone functionalities and forecasts future AI trends.** **Intellectual Skills** 1. **Develops critical thinking to analyze computer problems and formulate logical solutions.** 2. **Acquires ability to abstract and conceptualize complex AI algorithms.** 3. **Fosters analytical skills to evaluate AI system effectiveness and ethical**

	implications. 4. **Encourages creative problem-solving in applying AI concepts to novel scenarios and predicting future advancements.** **Practical Skills** 6. **C++ Programming:** Write, compile, and execute C++ programs to solve specific problems, demonstrating proficiency in the use of variables, control structures, functions, and classes. 7. **Data Handling and File Management:** Implement file handling operations in C++ and manage data using appropriate data structures, such as arrays, pointers, and linked lists. 8. **Memory Management:** Apply dynamic memory management techniques in C++, including the use of pointers, dynamic allocation, and deal location. 9. **Use of Development Tools:** Utilize modern integrated development environments (IDEs) and debugging tools to write, test, and debug C++ programs effectively. **Transferable Skills** 1. Cultivates **problem-solving abilities** applicable beyond technical contexts, fostering systematic approaches. 2. Enhances **analytical reasoning and decision-making** by evaluating technical and ethical dilemmas. 3. Improves **communication skills** through discussions on complex AI concepts and ethical debates. 4. Promotes **adaptability and continuous learning** for navigating rapidly evolving technological landscapes
Indicative Contents المحتويات الإرشادية	**Indicative content includes the following :** **1. Computer Troubleshooting** • **Hardware Issues:** Diagnostics, component replacement, POST codes. • **Operating System:** Boot problems, system restore, driver conflicts. • **Network:** Wi-Fi, IP config, basic router/modem troubleshooting. • **Software:** Crashes, compatibility, malware removal. • **Maintenance:** Disk cleanup, updates, backups. **2. Introduction to AI** • **What is AI?** Definitions, history, Turing Test. • **Core Concepts:** Agents, search algorithms. • **AI Branches:** ML, DL, NLP, CV, Robotics. • **ML Types:** Supervised, Unsupervised, Reinforcement Learning. • **Basic Algorithms:** Decision Trees, K-Nearest Neighbors. **3. Application of AI** • **Healthcare:** Diagnosis, drug discovery.

	• **Finance:** Fraud detection, trading. • **Autonomous Systems:** Self-driving cars, drones. • **Entertainment:** Recommendation systems, gaming. • **Smart Cities:** Traffic, energy optimization. **4. Tools of AI** • **Programming:** Python. • **Libraries:** NumPy, Pandas, Scikit-learn. • **Deep Learning Frameworks:** TensorFlow, PyTorch. • **Environments:** Jupyter, Google Colab. • **Cloud AI Services:** AWS, Google Cloud, Azure AI. **5. Ethical AI** • **Bias & Fairness:** Algorithmic bias, data fairness. • **Privacy:** Data collection, anonymization, GDPR. • **Transparency:** Explainable AI (XAI), black-box models. • **Accountability:** Responsibility, legal frameworks. • **Societal Impact:** Job displacement, equity. **6.** AI in Smartphones • Voice Assistants: Siri, Google Assistant. • Biometrics: Facial recognition, fingerprint unlock. • Camera: Image processing, scene recognition. • Text & Keyboard: Predictive text, autocorrect. • Personalization: App/content recommendations. • On-device AI: Edge computing benefits. 7. **Future of AI** • **AGI:** Concepts, challenges. • **AI & Work:** Automation, new jobs. • **Human-AI:** Collaboration, augmentation. • **Safety & Governance:** Regulation, cooperation. • **Emerging Trends:** Generative AI, Neuromorphic. • **Long-term Impact:** Societal transformation.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The Learning and Teaching Strategies describe the methods and approaches used to deliver content and ensure students achieve the learning outcomes. Common strategies include: 1. **Lectures:** Provide core knowledge about computers and AI programming. 2. **Lab Sessions:** Hands-on practice with programming exercises to apply what's learned in lectures.

	3. **Assignments:** Individual tasks to write Matlab programs, helping build problem-solving skills. 4. 0nsite Assignments: Collaborative Assignments where students work together to create a software application. 5. **Tutorials:** Small group sessions to help with difficult topics and answer questions. 6. **Online Resources:** Access to lecture notes, tutorials, and quizzes for extra practice outside class. 7. **Assessments:** Regular quizzes, assignments, and a final project or exam to measure understanding.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	27	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	75		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	8% (16)	5, 10	LO #2,3, 8,9
	0nsite Assignments	-	-	Continuous	LO # 1-15
	Online –assign.	2	4% (8)	Continuous	LO # 1-15
	Projects	-	-	-	-
	Lab	1	10% (10)	13	LO # 1-15
	Report	2	3% (6)	4, 8	LO # 4, 8
Summative assessment	**Midterm Exam**	2	5% (10)	6,12	LO # 1-11
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Security and network.
Week 2	Security and network.
Week 3	Operating System and Graphical User Interface (GUI)
Week 4	E-commerce
Week 5	
Week 6	Computer troubleshooting
Week 7	
Week 8	MID Exam 1
Week 9	Introduction to AI
Week 10	Ethical challenge in AI
Week 11	The role of AI in modern smartphone
Week 12	Future of AI
Week 13	Ethical challenge in AI
Week 14	Application and tools of AI
Week 15	MID Exam 2
Week 16	Final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Basics of computer concepts: Introduction to matlab
Week 2	Basics of computer concepts: matlab
Week 3	Operating System and Graphical User Interface (GUI)
Week 4	Basic arithmetic
Week 5	
Week 6	Matrix
Week 7	
Week 8	Vector and polynomial equation
Week 9	
Week 10	Function in matlab
Week 11	
Week 12	Simulink
Week 13	
Week 14	Loop
Week 15	Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	**1- Russell, S. J., & Norvig, P. (2020). *Artificial Intelligence: A Modern Approach* (4th ed.). Pearson.** **2- Artificial Intelligence Basics: A Non-Technical Introduction** **3-** **4- Stanford University's AI Index Report (Annual Publication)** **5- AWS Machine Learning Documentation: (aws.amazon.com/machine-learning)**	No

	6- Google Cloud AI & Machine Learning Documentation: (cloud.google.com/ai) 7- Microsoft Azure AI Documentation: (azure.microsoft.com/en-us/solutions/ai)	
Recommended Texts	-	-
Websites	-	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
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	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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Fundamentals of Engineering Mathematics**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MATH120**				
ECTS Credits	**7**				
SWL (hr/sem)	**175**				
Module Level	1		**Semester of Delivery**	2	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Ali M Miftin		**e-mail**	ali.m.miftin@nahrainuniv.edu.iq	
Module Leader's Acad. Title	Lecturer		**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	26/08/2024		**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 أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	The student will study mathematical theories and application. On completion of this course the student will be able to: 1. Solve equations of complex numbers and calculate roots of complex numbers. 2. Evaluate integrals of polynomials or transcendental functions 3. Set a mathematical model for bacterial growth and population or radioactive decay 4. Convert equations to parametric representations
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understand complex numbers and how to calculate its roots 2. Understand definite and Indefinite integrals and their applications 3. Understand how to calculate the arch length and the surface area 4. Understand parametric equations
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A – complex Number Solve equation with complex number , finding roots of [4 hrs] Part A – mdeling growth or recession The Logarithm Defined as an Integral, Exponential Change and Separable Differential Equations , Hyperbolic Functions, Relative Rates of Growth [12 hrs] Part B - evaluate the integral Area and Estimating with Finite Sums ,Sigma Notation and Limits of Finite Sums The Definite Integral ,The Fundamental Theorem of Calculus ,Indefinite Integrals and the Substitution Method ,Definite Integral Substitutions and the Area Between Curves [28 hrs] Part C - parametric representation for a given function Parametrizations of Plane Curves , Calculus with Parametric Curves , Polar Coordinates Graphing Polar Coordinate Equations , Areas and Lengths in Polar Coordinates [16 hrs]

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم	
Strategies	Assessment is based on hand-in assignments, written exam, Quizzes.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	82	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	175		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (5)	5, 10	LO # 2, 4
	Online Assignments	10	10% (1)	1,2,3,4,6,7,9, 11,12,13	All
	On site Assignments	2	10% (5)		
	Seminars	2	10% (5)		
Summative assessment	**Midterm Exam**	3 hr	10% (10)	8,15	All
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Complex Numbers
Week 2	Integrals Area and Estimating with Finite Sums
Week 3	-Sigma Notation and Limits of Finite Sums

	-The Definite Integral
Week 4	-The Fundamental Theorem of Calculus -Indefinite Integrals and the Substitution Method
Week 5	Definite Integral Substitutions and the Area Between Curves
Week 6	Applications of Definite Integrals -Volumes Using Cross-Sections Volumes Using Cylindrical Shells
Week 7	-Arc Length -Areas of Surfaces of Revolution
Week 8	-MID EXAM Parametric Equations and Polar Coordinates Parametrizations of Plane Curves
Week 9	-Calculus with Parametric Curves -Polar Coordinates
Week 10	-Graphing Polar Coordinate Equations -Areas and Lengths in Polar Coordinates
Week 11	-Conic Sections -Conics in Polar Coordinates
Week 12	The Logarithm Defined as an Integral
Week 13	Exponential Change and Separable Differential Equations
Week 14	Hyperbolic Functions
Week 15	MID EXAM
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered

Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Thomas' calculus : early transcendentals	Yes
Recommended Texts		No
Websites	Microsoft Math soft MathCad Autograph	

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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Biology**			**Module Delivery**	
Module Type	**Support or related learning activity**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**BIOL110**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	1		**Semester of Delivery**	1	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Assis. Prof. Dr. Rana I. Mahmood		**e-mail**	rana.i.mahmood@nahrainuniv.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	01/06/2023		**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 أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To contribute to students' general education through their involvement in the process of scientific investigation and the acquisition of biological knowledge and understanding 2. To encourage in students an attitude of scientific enquiry, of curiosity and self-discovery through (i) individual study and personal initiative (ii) team work (iii) class-directed work 3. To develop an understanding of biological facts and principles 4. To enhance an interest in and develop an appreciation of the nature and diversity of organisms 5. To create an awareness of the application of biological knowledge to modern society in personal, social, economic, environmental, industrial, agricultural, medical, waste management and other technological contexts 6. To develop in students an ability to make informed evaluations about contemporary biological issues.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. This course introduces the students to fundamental concepts in biology. 2. Identify and describe the main features of the four main classes of important biological macromolecules. 3. Identify and explain a variety of cellular components 4. Identify membrane-bound organelles found in eukaryotic cells. 5. Describe and explain the structure and function of membranes 6. Relate DNA structure to the process of DNA replication 7. Describe the conversion of DNA to RNA to proteins 8. Describe and explain the various stages of cell division 9. Explain the metabolic pathways involved in the capture and release of energy in cells
Indicative Contents المحتويات الإرشادية	1. Introduction to biology. 2. The essential Biomolecules. 3. Cell as the basic units of living organisms (prokaryotic and Eukaryotic cells). 4. Structure of Eukaryotic cell (Plasma membrane, Organelles and Cytoplasm). 5. Cell membranes and transport (Fluid mosaic membranes, Movement into and out of cells) 6. Introduction genetics: • Gene Expression (transcription and translation) • Protein synthesis and RNA types • Cell division and control of cell division • Reproductive cell division. • Cellular diversity and aging of cells 7. Energy and respiration

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Assessment is based on hand-in assignments, written exam, Case study, Quizzes, seminars, Practical testing and Online testing.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	52	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	3	15% (5)	4,8, 10	LO # 1, 2, 3, 7 and 8
	Onsite Assignment	1	5% (5)	11	LO # 1-15
	Seminars	1	10% (10)	8,9	LO # 1-15
	Report	1	10% (10)	10	LO # 1-15
Summative assessment	**Midterm Exam**	1 hr	10% (10)	7	LO # 4-6
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	The properties of life, the levels of organization of living things
Week 2	The main features of the four main classes of important biological biomolecules
Week 3	Types of cells, animal cell
Week 4	Cell structure (The cytoplasm, cytoskeleton, cilia and flagella, ribosomes, Endoplasmic reticulum, golgi apparatus, lysosomes, peroxisomes, proteasomes, mitochondria)
Week 5	The function of the plasma membrane, Membrane fluidity, membrane permeability, Gradient across the plasma membrane.

Week 6	Transport across the plasma membrane, passive transport, simple diffusion, facilitated diffusion, carrier-mediated facilitated diffusion, osmosis
Week 7	The nucleus, transcription, translation
Week 8	Cell division, control of cell division
Week 9	Midterm Exam
Week 10	Reproductive cell division, cellular diversity, aging and cells
Week 11	The reactants and products of cellular respiration and where these reactions occur in a cell
Week 12	The process of glycolysis and identify its reactants and products
Week 13	The process of pyruvate oxidation and identify its reactants and products
Week 14	The process of the citric acid cycle (Krebs cycle) and identify its reactants and products
Week 15	The respiratory chain (electron transport chain) and its role in cellular respiration
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Biology 2e, Senior Contributing Authors Mary Ann Clark, Texas Wesleyan University Jung Choi, Georgia Institute Of Technology Matthew Douglas, Grand Rapids Community College, 2018.	No
Recommended Texts		
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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Electrical Circuits I**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MDER110**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	1		**Semester of Delivery**	1	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Dr. Hussain Abed Jaber		**e-mail**	hussainjaber2000@nahrainuniv.edu.iq	
Module Leader's Acad. Title	Lec.		**Module Leader's Qualification**	PhD	
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

Module description

The DC Electrical Circuits course module teaches the basics of direct current circuits, covering concepts like voltage, current, resistance, and power. You'll learn how to analyze and simplify circuits using tools like Ohm's law and circuit theorems. The module explores practical applications of DC circuits in electronics, power systems, and telecommunications. Overall, it provides a foundation for understanding and working with DC circuits.

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 أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To develop problem solving skills and understanding of circuit theory through the application of techniques. 2. To understand voltage, current and power from a given circuit. 3. This course deals with the basic concept of electrical circuits. 4. This is the basic subject for all electrical and electronic circuits. 5. To understand Kirchhoff's current and voltage Laws problems. 6. To perform mesh and Nodal analysis.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Recognize how electricity works in electrical circuits. 2. List the various terms associated with electrical circuits. 3. Summarize what is meant by a basic electric circuit. 4. Discuss the reaction and involvement of atoms in electric circuits. 5. Describe electrical power, charge, and current. 6. Define Ohm's law. 7. Identify the basic circuit elements and their applications. 8. Discuss the operations of sinusoid and phasors in an electric circuit. 9. Discuss the various properties of resistors, capacitors, and inductors. 10. Explain the two Kirchoff's laws used in circuit analysis. 11. Identify the capacitor and inductor phasor relationship with respect to voltage and current.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. • Fundamentals of Electrical Circuits (Electrical Quantities, Measurements and Components). [6 hrs] • Ohm's law, Energy, and Power. [3 hrs] • Kirchhoff's & divider's Laws. [4 hrs] • Series, Parallel, and Series-Parallel Circuits. [10 hrs] • Theorems: Norton, Nodal, Mesh, Source Transformation, Maximum Power Transfer, Thevenin and Superposition. [20 hrs] • Delta-Star Networks. [4 hrs] • Revision problem classes [6 hrs] • Laboratory [45 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Assessment is based on hand-in assignments, written exam, Case study, Quizzes, Practical testing and Online testing.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	94	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	31	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.066
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**	3	12% (4)	Continuous	LO # 1-15
	Assignments	2	6% (3)	Continuous	LO # 1-157
	Projects / Lab.	3	12% (4)	Continuous	
	Report	10	10% (1)	Continuous	LO # 1-15
Summative assessment	**Midterm Exam**	3 hr	10% (10)	8,15	LO # 1-15
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction - Fundamentals of Electrical Circuits
Week 2	Elements of electrical circuits
Week 3	Ohm's law, Energy, and Power
Week 4	Review of Kirchhoff's & divider's Laws
Week 5	Series, Parallel Circuits

Week 6	Series-Parallel Circuits
Week 7	Source Transformation and Superposition Theorem
Week 8	1st mid exam
Week 9	Mesh Theorem
Week 10	Nodal Theorem
Week 11	Maximum Power Transfer Theorem
Week 12	Thevenin Theorem
Week 13	Norton Theorem
Week 14	Delta-Star Networks
Week 15	2nd mid exam
Week 16	**Final exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction /Basic Laboratory Test and Measurement Equipment
Week 2	Lab 2: Ohm's Law
Week 3	Lab 3: Series DC Circuits
Week 4	Lab 4: Parallel DC Circuits
Week 5	Lab 5: Series-Parallel DC Circuits
Week 6	Lab 6: Superposition Theorem
Week 7	Lab 7: Thevenin's Theorem
Week 8	Lab 8: Nodal Analysis
Week 9	Lab 9: Δ -Y and Y-Δ Conversions
Week 10	Lab 10: Maximum Power Transfer

Learning and Teaching Resources

مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Lectures	Yes
Recommended Texts	Fundamentals of Electric Circuits, C.K. Alexander and M.N.O Sadiku, McGraw-Hill Education	Yes
Websites	https://www.coursera.org/browse/physical-science-and-engineering/electrical-engineering	

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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Engineering Drawings**			**Module Delivery**	
Module Type	**Support or related learning activity**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**CREQ110**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	1		**Semester of Delivery**	1	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Zaid Mustafa Khudair		**e-mail**	Zaid.mustafa.kh@nahrainuniv.edu.iq	
Module Leader's Acad. Title	Asst. Lec.		**Module Leader's Qualification**	MSc.	
Module Tutor	Zaid Mustafa Khudair		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01/06/2024		**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 أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	To teach the students the ability to read and implement technical design drawing which is the most important requirement of all technical people in any profession. Drawings prepared in one country may be utilized in any other country irrespective of the language spoken. Hence, engineering drawing is called the universal language of engineers. Any language to be communicative should follow certain rules so that it conveys the same meaning to everyone. Similarly, drawing practice must follow certain rules, if it is to serve as a means of communication. Lectures have been prepared to help students how to learn and understand the basic concepts and application of engineering drawing and its importance and application in the design and implementation of the biomedical engineering profession.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. CLO-1: Understanding the principles and conventions of engineering drawing and acquiring knowledge of different types of engineering drawings and their applications as well as dimensioning and tolerancing principles to ensure proper communication of design specifications. 2. CLO-2: Developing proficiency in creating accurate and detailed technical drawings using appropriate drafting tools and software and gaining familiarity with various drawing standards and practices followed in engineering and manufacturing industries. 3. CLO-3: Gaining skills in interpreting and understanding engineering drawings created by others. Demonstrating the ability to create and interpret different views, sections, and projections of objects. 4. CLO-4: Developing spatial visualization skills to translate 2D drawings into 3D representations.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A – Engineering Drawing Principle In this part the student will be introduced to the purpose of engineering drawing with the required tools and instructions related to using different tools for different designs. [4 hrs] In course Description and Introduction to engineering drawing Instruments and Accessories the drawing board and paper preparation will be explained with the instructions and required information to be included in the table. In addition to Writing letters rules and handwriting. [5 hrs] Lines, Dimensions, Scales will be explained including different line types and how to include dimensions and scale in the design drawing in addition, Practicing on different types of lines and their application. [5 hrs] Geometrical Shapes and related Calculations will be explained including basic and complicated geometrical shapes using different methods to demonstrate the

	geometrical shapes in the engineering design representation. [8 hrs] Part B – Projection Drawing Principle Theoretical concept of projection will be explained including how to transform shapes and Standards for drawing projections. In this part the students will apply the learning outcome from part A to be implemented in drawing different projections. [6 hrs] Projections will also be explained on how the most efficient method is and to understand the third projection from the other two and how to include the minimum required projections to represent a 3D object into 2D representation. This part also includes the introduction to cross-sectional representation in projection drawing. [10 hrs] Part C – Isometric Drawing Principle Theoretical concept of isometric will be explained including how to transform shapes and Standards for drawing isometrics. In this part the students will apply the learning outcome from part A and B to be implemented in drawing different isometrics. [4 hrs] Isometrics will also be explained on how the most efficient method is and to understand the third projection from the other two and how to include the minimum required projections to represent a 3D object into 2D representation. This part also includes the introduction to cross-sectional representation in isometric drawing. [7 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Assessment is based on hand-in assignments, written exam, Case study, Quizzes, seminars, Practical testing and Online testing.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.1
Total SWL (h/sem)	125		

الحمل الدراسي الكلي للطالب خلال الفصل	

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	4	12% (3)	5, 10, 13	LO # 2, and 3
	Onsite Assignments	6	12% (2)	Continuous	LO # 4 and 5
	Lab	4	8% (2)	4,8	LO # 1, 2, 3 and 4
	Online Assignments	4	8% (2)	Continuous	LO # 1,2,3, and 4
Summative assessment	**Midterm Exam**	3 hr	10% (10)	7,13	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	Course Description and Introduction to engineering drawing Instruments and Accessories
Week 2	Drawing board and paper preparation with the information table
Week 3	Writing letters rules and handwriting
Week 4	Lines, Dimensions, Scale: Explaining and Practicing on different types of lines and their application
Week 5	Geometrical Shapes and related Calculations: Explaining and Practicing (Basic geometrical shapes)
Week 6	Geometrical Shapes and related Calculations: Explaining and Practicing on different types of lines and their application (basic and advanced geometrical shapes)
Week 7	Projections: Theoretical concept
Week 8	Projection: Shapes and Standards for drawing projections
Week 9	Projections: application of lines, scales, and shapes in projections
Week 10	Projection: Application of Cross-section
Week 11	Isometric drawing: Theoretical concept
Week 12	Isometric drawing: application of lines, shapes, and scales in engineering designs
Week 13	Isometric drawing: application of lines, shapes, and scales in engineering designs (Practice)

Week 14	Projections and isometric design applications
Week 15	Review for the concepts applied in engineering drawing design
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Course Description and Introduction to engineering drawing Instruments and Accessories
Week 2	Lines, Dimensions, Scale: Explaining and Practicing
Week 3	Lines, Dimensions, Scale: Further Practicing on different types of lines and their application
Week 4	Geometrical Shapes and related Calculations: Explaining and Practicing (Basic geometrical shapes)
Week 5	Geometrical Shapes and related Calculations: Further Practicing on different types of lines and their application (advanced geometrical shapes)
Week 6	Geometrical Shapes and related Calculations: Further Practicing on different types of geometrical shapes and their application in engineering design drawing
Week 7	Projections: Theoretical concept
Week 8	Projection: Shapes and Standards for drawing projections
Week 9	Projections: application of lines, scales, and shapes in projections
Week 10	Projections: application of lines, scales, and shapes in projections (practice)
Week 11	Projection: Application of Cross-section
Week 12	Isometric drawing: Theoretical concept
Week 13	Isometric drawing: application of lines, shapes, and scales in engineering designs
Week 14	Isometric drawing: application of lines, shapes, and scales in engineering designs (Practice)
Week 15	Review for the concepts applied in engineering drawing design
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	الرسم الهندسي، الجامعة التكنلوجية مركز التدريب والنشر، عبد الرسول الخفاف، 1986	Yes

Recommended Texts	Textbook of Engineering Drawing, K Venkata Reddy, second edition	No
Websites	Youtube for practicing on geometrical representation in engineering drawing with additional exercises.	

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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Engineering Graphics			**Module Delivery**	
Module Type	**Support**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Code	CREQ120				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	UGV		**Semester of Delivery**	2	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Zaid Mustafa Khudair		**e-mail**	Zaid.mustafa.kh@nahrainuniv.edu.iq	
Module Leader's Acad. Title	Asst. Lec.		**Module Leader's Qualification**	Msc	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	05/01/2025		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	1	**Semester**	2
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To develop skills and understanding of engineering drawing techniques using drawing software. 2. To understand the principle of using AUTOCAD to draw different 2D models and 3D models. 3. This course deals with the basic concept of engineering geometry. 4. This is the basic subject for drawing of points in space. 5. To understand the principal of projection methods. 6. To find the true length and areas of different objects in space.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Can well operate with drawing software. 2. can understand how lines and points performs in space. 3. Has a skill to design and draw 2D and 3D models. 4. Can calculate and conclude the true length of the lines and shapes area. 5. Be familiar with the using of Angle measurement tool and chart sheets 6. Can develop his knowledge of using computer software in engineering drawings.
Indicative Contents المحتويات الإرشادية	Part A – engineering geometry Draw points and lines projections in space [4 hrs] Class work1[1 hr] Find the true length of the line and inclinations [4 hrs] Class work2[1 hr] Find the shapes using supportive plane and areas. [4 hrs] Class work3[1 hr] Final exam [1 hr] Part B – engineering graphics Introduction to Auto CAD [2 hrs] Introducing drawing and modification menus, font options, and layer settings [4hr] Class works [4 hrs] Introduction to 3D models [2 hrs] Class works [2hrs] Mid-term exam [1 hrs] Final exam [2 hr]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Assessment is based on hand-in assignments, written exam, class works, Quizzes, Practical testing and home works.

Student Workload (SWL) الحمل الدراسي للطالب			
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	3.1
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)	6, 12	LO # 2,4,5
	Assignments	6	30% (30)	3,6,8,10,12	LO # 1,3,6
	Projects / Lab.	0	0% (0)		
	Report	0	0% (0)	0	
Summative assessment	**Midterm Exam**	1 hr	10% (10)	15	LO # 1-6
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Draw points and lines projections in space [4 hrs] Part B – engineering graphics Introduction to Auto CAD [2 hrs]

	Introducing drawing and modification menus, font options, and layer settings [4hr] Class works [4 hrs] Introduction to 3D models [2 hrs] Class works [2hrs] Mid-term exam [1 hrs] Final exam [2 hr]
Week 2	Draw points and lines projections in space
Week 3	Draw points and lines projections in space
Week 4	Draw points and lines projections in space
Week 5	Class work1[1 hr]
Week 6	Find the true length of the line and inclinations
Week 7	Find the true length of the line and inclinations
Week 8	Find the true length of the line and inclinations
Week 9	Find the true length of the line and inclinations
Week 10	Class work2[1 hr]
Week 11	Find the shapes using supportive plane and areas.
Week 12	Find the shapes using supportive plane and areas.
Week 13	Find the shapes using supportive plane and areas.
Week 14	Find the shapes using supportive plane and areas.
Week 15	Class work3[1 hr]
Week 16	**the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction to Auto CAD
Week 2	Introducing drawing and modification menus, font options, and layer settings
Week 3	Introducing drawing and modification menus, font options, and layer settings
Week 4,5	Class works [4 hrs]
Week 6,7	Class works [4 hrs]
Week 8,9	Introduction to 3D models
Week	Class works

10,11	
Week 12	Mid term exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Engineering geometry text book	Yes
Recommended Texts	lectures	No
Websites	Youtube.com/learning autocad	

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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Mathematics**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MATH110**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	1		**Semester of Delivery**	1	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Ali M Mifin		**e-mail**	ali.m.miftin@nahrainuniv.edu.iq	
Module Leader's Acad. Title	Lecturer		**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	3/09/2024		**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 أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	The student will study mathematical theories and application. On completion of this course the student will be able to: 1. Introduce the concept of functions 2. Introduce the concept of trigonometric functions 3. Differentiate equations 4. Apply differentiation to find maximum and minimum points, optimization
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understand graph of a function 2. Understand identities of trigonometric functions 3. Understand how to find maximum and minimum values of any functions 4. Understand inverse functions and logarithms.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A - Functions Graph of functions, combining functions, Exponential Functions, Inverse Functions and Logarithms. [15 hrs.] Part B - Limits and Continuity Rates of Change and Tangents to Curves, Limit of a Function and Limit Laws, The Precise Definition of a Limit, One-Sided Limits, Continuity, Limits Involving Infinity; Asymptotes of Graphs.. [6 hrs.] Part C - Derivatives Tangents and the Derivative at a Point, The Derivative as a Function, Differentiation Rules, The Derivative as a Rate of Change, Derivatives of Trigonometric Functions, The Chain Rule, Implicit Differentiation, Inverse Trigonometric Functions, Linearization and Differentials, Related Rates. [24 hrs.] Part D - Applications of Derivatives Extreme Values of Functions, Monotonic Functions and the First Derivative Test, Concavity and Curve Sketching, Indeterminate Forms and L'Hôpital's Rule. [15 hrs.]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم

Strategies	Assessment is based on hand-in assignments, written exam, Quizzes,.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem.) الحمل الدراسي المنتظم للطالب خلال الفصل	93	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem.) الحمل الدراسي غير المنتظم للطالب خلال الفصل	57	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.8
Total SWL (h/sem.) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (5)	5, 10	LO #3, 4
	Online Assignments	10	10% (1)	1,2, 3,4,6,7,9,10, 11, 12	All
	On site Assignments	2	10% (5)	4,10	All
	Seminars	2	10% (5)	5,8	All
Summative assessment	**Midterm Exam**	2hr	10% (10)	8,15	All
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Functions -Vertical line test -Increasing and decreasing functions - common functions

Week 2	-Inequalities -Absolute Value -Combining Functions; Shifting and Scaling Graphs
Week 3	-Trigonometric Functions -Graphing with Software
Week 4	-Inverse Functions and Logarithms - Inverse Functions
Week 5	-Logarithms - Limits /Rates of Change and Tangents to Curves
Week 6	-Limits / The Precise Definition of a Limit - Limits / One-Sided Limits
Week 7	-Limits Involving Infinity; Asymptotes of Graphs
Week 8	-MID EXAM - Derivatives -Tangents and the Derivative at a Point - Differentiation Rules -The Chain Rule
Week 9	-Implicit Differentiation -Derivatives of Inverse Functions and Logarithms
Week 10	- Inverse Trigonometric Functions - Related Rates
Week 11	Applications of Derivatives -Extreme Values of Functions
Week 12	Monotonic Functions and the First Derivative Test - Concavity and Curve Sketching
Week 13	-Indeterminate Forms and L'Hôpital's Rule
Week 14	- Applied Optimization

	-Antiderivatives
Week 15	-MID EXAM
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Thomas' calculus : early transcendentals	Yes
Recommended Texts	DC Electrical Circuit Analysis: A Practical Approach Copyright Year: 2020, dissidents.	No
Websites	Microsoft Math soft MathCad Autograph	

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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Analytical Mathematics**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MATH220**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	2		**Semester of Delivery**	4	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Ali M Miftin		**e-mail**	Ali.m.miftin@nahrainuniv.edu.iq	
Module Leader's Acad. Title	Lecturer		**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	26/08/2024		**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 أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	The student will study mathematical theories and application. On completion of this course the student will be able to: 1. Solve problems by vectors 2. Solve problems of vector fields 3. Classify and solve separable, linear and exact differential equations. 4. Set a mathematical model for practical problems like mechanical vibrations or simple electric circuit RLC
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understand vector and vector calculus 2. Understand vector fields and their theories 3. Understand differential equations and classify them and chose the proper method to solve it 4. Understand mechanical vibration 5. Understand the differential equation that describe the current in RLC circuits
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A - Vectors Vectors in 2-Space and 3-Space, Inner Product (Dot Product), Vector Product (Cross Product), Vector and Scalar Functions and Fields, Gradient of a Scalar Field. Directional Derivative, Divergence of a Vector Field, Curl of a Vector Field. [15 hrs.] Vector Integral Calculus. Integral Theorems, Line Integrals, Path Independence of Line Integrals, Green's Theorem in the Plane, Surfaces for Surface Integrals, Surface Integrals, Triple Integrals. Divergence Theorem of Gauss, . [20 hrs.] Part B - First-Order Differential Equations Solution Curves Without a Solution , Direction Fields , Autonomous first-Order DEs , Separable Equations , Linear Equations , Exact Equations , Solutions by Substitutions , A Numerical Method , Linear Models , Nonlinear Models , Modeling with Systems of First-Order DEs , [20 hrs.] Part C - Higher-Order Differential Equations Theory of Linear Equations , Initial-Value and Boundary-Value Problems , Homogeneous Equations , Nonhomogeneous Equations , Reduction of Order , Homogeneous Linear Equations with Constant Coefficients , Undetermined Coefficients , Variation of Parameters , Cauchy–Euler Equations , Linear Models: Initial-Value Problems Spring/Mass Systems: Free Undamped Motion , Spring/Mass Systems, Free Damped Motion, Spring/Mass Systems: Driven Motion , Series Circuit Analogue , Linear Models: Boundary-Value Problems , Green's Functions , Initial-Value Problems . [15 hrs.].

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Assessment is based on hand-in assignments, written exam, Quizzes.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (5)	3, 12	LO #1, 2, 3,4, and 5
	Online Assignments	10	10% (1)	1,2,4,5,6,7,8, 10,11,12	All
	On site Assignments	2	10% (5)		
	Seminars	2	10% (5)		
Summative assessment	**Midterm Exam**	3 hr	10% (10)	9, 15	All
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Vector Differential Calculus/ -Vectors in 2-Space and 3-Space
Week 2	- Inner Product (Dot Product)

	- Vector Product (Cross Product)
Week 3	Vector and Scalar Functions and Their Fields. Vector Calculus: Derivatives
Week 4	Gradient of a Scalar Field. Directional Derivative -Examples
Week 5	Divergence of a Vector Field -Examples
Week 6	Curl of a Vector Field -Examples
Week 7	Vector Integral Calculus. Integral Theorems - Line Integrals
Week 8	- Path Independence of Line Integrals - Double Integrals
Week 9	MID EXAM Green's Theorem in the Plane
Week 10	-Surface Integrals Triple Integrals. Divergence Theorem of Gauss
Week 11	Ordinary Differential Equations of the First Order -Classification of Differential Equations
Week 12	-Separable First-Order Equations - Homogeneous First-Order Equations
Week 13	-Exact First-Order Equations -Integrating Factors for First-Order Equations
Week 14	-Second-Order Equations of Reducible Order -Applications of First-Order Differential Equations
Week 15	Linear Differential Equations MID EXAM
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Advanced Engineering Mathematics 9th ed. / Kreysziq	Yes
Recommended Texts	Advanced Engineering Mathematics 6th ed./ Zill	No
Websites	Microsoft Math soft MathCad Autograph	

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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Anatomy I**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MDER213**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	2		**Semester of Delivery**	3	
Administering Department	Type Dept. Code		**College**	CREQ	
Module Leader	Assis. Prof Dr. Rana I. Mahmood		**e-mail**	rana.i.mahmood@nahrainuniv.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	01/06/2023		**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 أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. This course will provide the students with the basic knowledge of human anatomy in the context of macroscopy and microscopic structure, mechanics, and function. 2. The focus is on the healthy body, concerning diseases and aging. 3. It provides basic biological knowledge in human systems for bioengineering applications.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Appreciate the anatomy of the cell and its subcomponents and functions. 2. Able to identify different bones, and their function within the human body. 3. Make a distinction between joints; appreciate the function of muscles. 4. Have a basic knowledge of the anatomy of the shoulder girdle; the arm and elbow; the forearm and wrist; the hand; the back; the pelvis and hip; the thigh and knee; the foot; pulses and reflexes in the limbs; nerve injuries in the limbs; practical session upper limb and lower limb. 5. Understanding of Musculoskeletal Anatomy: Students should be able to identify and describe the bones, muscles, and joints of the trunk, including the spine, rib cage, and associated musculature. This knowledge is crucial for understanding how the trunk supports and protects vital organs. 6. Knowledge of Cardiovascular: Students should understand the anatomical structures of the heart, and major blood vessels (such as the aorta and vena cava), including their spatial relationships within the trunk. 7. Understanding of Anatomical Variations and Pathologies: Students should recognize common anatomical variations and pathologies that can affect the trunk, such as scoliosis, herniated discs, or thoracic aortic aneurysms, and understand how these might impact the design and function of biomedical devices.
Indicative Contents المحتويات الإرشادية	**An Introduction to the Human Body (3h)** • Terms of description • Movement • Basic anatomical structures • Imaging anatomy • Sectional anatomy **Anatomy of the upper limbs (8h)** • Bone • Muscles • Joints • Movements • Nerve injuries **Anatomy of the lower limbs (8h)** • Bone • Muscles • Joints • Movements • Nerve injuries **The Thorax (3h)**

	• Thoracic cage • Intercostal spaces & muscles • Respiration **Pleural cavity (3h)** • The pleura • The lungs **The Mediastinum (3h)** • Division & sub Division **The Heart (3h)** • Heart chambers • Great blood vessels • Blood circulation

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	1. Integrative Lectures with Clinical and Engineering Context 2. 3D Visualization and Virtual Dissection Tools 3. Anatomical Lab Work with Emphasis on Engineering Applications 4. Assessments through regular quizzes, mid-term exams, practical exams, seminars, and reports.

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	46	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.1
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**	1	5% (5)	6	LO # 1-5
	Seminar	1	10% (10)	10	LO # 1-14
	Lab.	1	15% (15)	10	1-9
	Report	1	10% (10)	7	LO # 1-14
Summative assessment	**Midterm Exam**	3 hr	10% (10)	10	LO # 6-9
	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 anatomy** (Terms of description & movement, Basic anatomical structures, Imaging anatomy, sectional anatomy)
Week 2	**The Upper & Lower Limbs** (Osteology of shoulder region, joints of shoulder girdle, Scapular & shoulder muscles, axilla & brachial plexus)
Week 3	Arm & elbow joint
Week 4	The Cubital fossa & forearm
Week 5	Wrist & hand
Week 6	The gluteal region
Week 7	The hip joint &osteology of femur, the thigh
Week 8	Knee joint & popliteal fossa, the leg &its compartments, venous system of lower limb
Week 9	Ankle joint & arches of the foot, the foot, nerve injuries of lower limb
Week 10	**Midterm Exam**
Week 11	**The Thorax** (Thoracic cage organization - The sternum - The ribs & thoracic vertebrae)
Week 12	Intercostal space, Functional anatomy of respiration and diaphragm
Week 13	Pleural cavity, The Mediastinum (Division & sub Division)
Week 14	The Heart
Week 15	Seminars
Week 16	Preparatory week before the Final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	**Introduction to anatomy** (Terms of description & movement, Basic anatomical structures, Imaging anatomy, sectional anatomy)
Week 2	**The Upper & Lower Limbs** (Osteology of shoulder region, joints of shoulder girdle, Scapular & shoulder muscles, axilla & brachial plexus)
Week 3	Arm & elbow joint
Week 4	The Cubital fossa & forearm
Week 5	Wrist & hand
Week 6	The gluteal region
Week 7	The hip joint &osteology of femur, the thigh
Week 8	Knee joint & popliteal fossa, the leg &its compartments, venous system of lower limb

Week 9	Ankle joint & arches of the foot, the foot, nerve injuries of lower limb
Week 10	**The Thorax** (Thoracic cage organization. The sternum. The ribs & thoracic vertebrae)
Week 11	Intercostal space, Functional anatomy of respiration and diaphragm
Week 12	Pleural cavity, The Mediastinum (Division & sub Division)
Week 13	The Heart

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	**1.** Tortora G. J. Principles of Human Anatomy, tenth edition; 2005.	Yes
Recommended Texts	**1.** Seeley R. R.; Stephens T. D. & Tate P. (1998) Anatomy & Physiology, fourth edition. **2.** Moore K. L. &Dalley A. f. (1999). Clinically Oriented Anatomy, fourth edition.	No
Websites	https://www.kenhub.com/	

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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Anatomy II**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MDER222**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	2		**Semester of Delivery**	4	
Administering Department	Type Dept. Code		**College**	CREQ	
Module Leader	Assis. Prof Dr. Rana I. Mahmood		**e-mail**	rana.i.mahmood@nahrainuniv.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	01/06/2023		**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 أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims	1. This course will provide the students with the basic knowledge of human anatomy in the context of macroscopy and microscopic structure, mechanics, and

أهداف المادة الدراسية	function. 2. The focus is on the healthy body, concerning diseases and aging. 3. It provides basic biological knowledge in human systems for bioengineering applications.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Identify basic human anatomical parts and organ systems 2. Explain the interplay between structure and function, in health, disease, and aging 3. Communicate the application of anatomy and physiology knowledge to bioengineering solutions
Indicative Contents المحتويات الإرشادية	**The Abdomen (3h)** • The abdominal peritoneal Cavity • Peritoneal Folds • Posterior abdominal wall - Inguinal Cana **The diaphragm (1h)** **The Digestive System (3h)** • Overview of the Digestive System • Esophagus • The Stomach • The Small and Large Intestines • Accessory Organs in Digestion: The Liver, Pancreas, and Gallbladder **The Urinary System (3h)** • Gross Anatomy of the Kidney • Gross Anatomy of the ureter and bladder **Internal pelvic organs (2h)** • rectum, anal canal • Nerves and vessels of the pelvis • General plane of perineum - Male & female perineum **Head & Neck** **The Head (18h)** • The skull - organization & bones • The skull – cranial fossa & foramen • Scalp & face - muscles & vessels • Cranial Meninges • Orbit & eye - Nose & paranasal sinuses • The Ear • Oral cavity - teeth & tongue • The upper & lower jaws, salivary glands, muscles of mastication and temporomandibular joint • The upper & lower jaws, salivary glands, muscles of mastication and temporomandibular joint **The neck (6h)** • Organization & major vessels • neck viscera • cranial vertebrae **Neuroanatomy (6h)** • Parts & divisions of the nervous system • Gross anatomy of central nervous system (CNS) • Functional localization in the cerebrum • Blood supply of the CNS, meninges

	• CSF & ventricles, diencephalon, limbic system • Cerebellum & basal ganglia, spinal cord.

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	1. Integrative Lectures with Clinical and Engineering Context 2. 3D Visualization and Virtual Dissection Tools 3. Anatomical Lab Work with Emphasis on Engineering Applications 4. Assessments through regular quizzes, mid-term exams, practical exams, seminars, and reports.

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	46	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.1
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**	1	5% (5)	5	LO # 1-4
	Seminar	1	10% (10)	4	All
	Lab.	1	15% (15)	10	1-9
	Report	1	10% (10)	6	All
Summative assessment	**Midterm Exam**	3 hr	10% (10)	9	LO # 5-8
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	**The Abdomen** (The abdominal peritoneal Cavity, Peritoneal Folds -Alimentary Tract)
Week 2	The diaphragm - The Kidney, suprarenal & ureter
Week 3	Posterior abdominal wall - Inguinal Canal
Week 4	**The Pelvis** (Internal pelvic organs: rectum, anal canal - Nerves and vessels of the pelvis - General plane of perineum - Male & female perineum)

Week 5	**Head & Neck** (The skull - organization & bones - The skull – cranial fossa & foramens)
Week 6	Scalp & face - muscles & vessels, Cranial Meninges
Week 7	Orbit & eye - Nose & paranasal sinuses
Week 8	The ear
Week 9	**Mid Term Exam**
Week 10	Oral cavity - teeth & tongue
Week 11	The upper & lower jaws, salivary glands, muscles of mastication and temporomandibular joint
Week 12	The neck - organization & major vessels, neck viscera, and cranial vertebrae
Week 13	Parts & divisions of the nervous system, gross anatomy of the central nervous system (CNS), functional localization in the cerebrum
Week 14	Blood supply of the CNS, meninges - CSF & ventricles, diencephalon, limbic system, cerebellum & basal ganglia, spinal cord.
Week 15	Seminars
Week 16	Preparatory week before the Final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	**The Abdomen** (The abdominal peritoneal Cavity, Peritoneal Folds -Alimentary Tract)
Week 2	The diaphragm - The Kidney, suprarenal & ureter
Week 3	Posterior abdominal wall - Inguinal Canal, testis & scrotum
Week 4	**The Pelvis** (Internal pelvic organs: rectum, anal canal - Nerves and vessels of the pelvis - General plane of perineum - Male & female perineum)
Week 5	**Head & Neck** (The skull - organization & bones - The skull – cranial fossa & foramens)
Week 6	Scalp & face - muscles & vessels, Cranial Meninges
Week 7	Orbit & eye - Nose & paranasal sinuses
Week 8	The ear
Week 9	Oral cavity - teeth & tongue
Week 10	The upper & lower jaws, salivary glands, muscles of mastication and temporomandibular joint
Week 11	The neck - organization & major vessels, neck viscera, and cranial vertebrae
Week 12	Parts & divisions of the nervous system, gross anatomy of central nervous system (CNS), functional localization in the cerebrum
Week 13	Blood supply of the CNS, meninges - CSF & ventricles, diencephalon, limbic system, cerebellum & basal ganglia, spinal cord.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the**

		Library?
Required Texts	**1.** Tortora G. J. Principles of Human Anatomy, tenth edition; 2005.	Yes
Recommended Texts	**1.** Seeley R. R.; Stephens T. D. & Tate P. (1998) Anatomy & Physiology, fourth edition. **2.** Moore K. L. &Dalley A. f. (1999). Clinically Oriented Anatomy, fourth edition.	No
Websites	https://www.kenhub.com/	

Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
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Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
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MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Electronics I**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MDER210**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	2		**Semester of Delivery**	3	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Ahmed Faeq Hussein		**e-mail**	Ahmed.f.hussein@nahrainuniv.edu.iq	
Module Leader's Acad. Title	Asst. Prof.		**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	01/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Electrical Circuit I	**Semester**	1, 2
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To introduce the concept of semiconductors and devices along with applications, power supply components, diodes, and amplifiers. 2. To present a problem oriented introductory knowledge of Analog circuits and its applications. 3. To impart an in-depth knowledge in electronic semiconductor devices & circuits giving importance to the various aspects of design & analysis. 4. To provide a thorough understanding of the operational BJT circuits and their functions.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Employ simple lumped circuit models for resistors, sources, inductors, capacitors, and transistors in circuits. 2. Analyze circuits made up of linear lumped elements. Specifically, analyze circuits containing resistors and independent sources using techniques such as the node method, superposition and the Thevenin method. 3. Employ Boolean algebra to describe the function of logic circuits. 4. Design circuits which represent digital logic expressions. Specifically, design a gate-level digital circuit to implement a given Boolean function. 5. Check static discipline constraints in circuits. For example, determine if the circuit representing a gate provides adequate noise margins. 6. Understand the basics of semiconductors and Diodes 7. Analyse working of Rectifiers, filters, and regulators circuits. 8. Design biasing scheme for transistor circuits. 9. Model BJT and FET amplifier circuits
Indicative Contents المحتويات الإرشادية	Unit -I [22 hrs] **Diode Circuits:** Diode clipping circuits - Single level and two level clippers - Clamping circuits – Design of Zener Voltage Regulators. Unit -II [25 hrs] **Junction Transistor and Transistor Biasing**: CB, CE, CC (Relationship between α, β, γ) circuit configuration Input-output characteristics, Equivalent circuit of ideal and real amplifiers, L. Unit-III [28 hrs] **Bipolar Junction Transistors :** Review of BJT characteristics- Operating point of a BJT – Factors affecting stability of Q point and DC Biasing – Biasing circuits: fixed bias, collector to base bias, voltage division bias and self bias. (Derivation of stability factors for Voltage Divider Biasing only) –Bias compensation using diode and thermistor.

	Low frequency equivalent circuit of BJT Common: Emitter amplifier - AC Equivalent Circuit – Role of coupling and emitter bypass capacitors – h parameter model of BJT - Amplifier gains and impedances calculations using h equivalent circuit.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Assessment is based on hand-in assignments, written exam, Case study, Quizzes, seminars, Practical testing and Online testing.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	57	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1,2 and 7
	Assignments	4	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	15% (15)	Continuous	
	Report	1	5% (5)	13	LO # 5, 8 and 9
Summative assessment	**Midterm Exam**	3 hr	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	Diodes, diode equation
Week 2	Graphical/Load line analysis
Week 3	Diode models
Week 4	Zener diodes
Week 5	Diode applications; peak sample, power rectifier, clipping, clamping, regulator
Week 6	Bipolar transistors (BJT); Definitions
Week 7	Mid-term Exam
Week 8	BJT V-I characteristics, breakdown
Week 9	AC load line
Week 10	Transistor biasing
Week 11	Hybrid-pi equivalent circuit
Week 12	H-parameters
Week 13	Common-emitter large signal model, graphical analysis
Week 14	Common-collector, common base amplifiers
Week 15	Applications: current source, DC power supply regulator
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	V-I Characteristics of Silicon & Germanium PN Junction diodes 13
Week 2	V-I Characteristics of Zener Diode
Week 3	Diode application; clipping; clamping; voltage doubler
Week 4	Half Wave and Full Wave Rectifier
Week 5	Characteristics of BJT and DC load line
Week 6	Common Emitter BJT Amplifier
Week 7	BJT amplifier frequency response

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Electronic Devices and Circuit Theory Robert L Boylestad Louis Nashelsky Pearson 11th Edition, 2015	
Recommended Texts	Electronic Devices and Circuits Millman and Halkias Mc Graw Hill 4th Edition, 2015.	
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
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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

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MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Electronics II**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MDER220**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	2		**Semester of Delivery**	4	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Dr. Hussain Abed Jaber		**e-mail**	hussainjaber2000@nahrainuniv.edu.iq	
Module Leader's Acad. Title	Lecturer		**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	01/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية ألأخرى			
Prerequisite module	MDER120	**Semester**	3
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات إلرشادية	
Module Aims أهداف المادة الدراسية	1. Use intuition to describe the approximate time and frequency behavior of circuits containing energy storage elements. 2. Understand the concepts of employing simple models to represent non- linear and active elements-such as the MOSFET-in circuits. 3. Build circuits and take measurements of circuit variables using tools such as oscilloscopes, multimeters, and signal generators. Compare the measurements with the behavior predicted by mathematic models and explain the discrepancies. 4. Understand the relationship between the mathematical representation of circuit behavior and corresponding real-life effects. 5. Appreciate the practical significance of the systems developed in the course.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Design and compare biasing circuits for FET transistor amplifiers & explain the transistor switching. 2. Explain the concept of feedback, its types and design of feedback circuits 3. Design and analyze the operational amplifiers. 4. Design and analysis of FET and MOSFET amplifiers. 5. Determine the output produced by a circuit for a given set of inputs using the switch resistor model of a MOSFET. 6. Perform a small-signal analysis of an amplifier using small signal models for the circuit elements.
Indicative Contents المحتويات إلرشادية	Unit – I [25 hrs] **FET and JFET Transistors**: Introduction, device structures and physical operations, i-v characteristics, DC and AC load line, brief analysis as an amplifier. **MOS Field Effect Transistors**: Introduction, device structures and physical operations, i-v characteristics, brief analysis as an amplifier, and as a switch, Biasing, Unit-II [25 hrs] **FET and MOSFET circuits**: DC biasing; self-bias; feedback bias; voltage divider bias, fixed bias; AC analysis; Y-parameters analysis; H-parameters analysis **FET and MOSFET small signal operation:** models, single stage FET Amplifiers, MOSFET capacitances, common gate configuration; common source configuration; common drain configuration frequency response of CS amplifiers. Unit-III [25 hrs] **Amplifiers circuits:** MOS differential Pair, Small signal operation, frequency response of differential amplifier, Introduction to differential amplifier with active load. **Multistage amplifiers:** direct; capacitor coupled amplifier; cascade amplifier; cascode

	amplifier. **Operational amplifier (OpAmp):** Definition; structure design; inverting configuration; non-inverting configuration; summing amplifier; integration amplifier; differentiation amplifier.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Assessment is based on hand-in assignments, written exam, Case study, Quizzes, seminars, Practical testing and Online testing.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خالل الفصل	93	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خالل الفصل	32	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خالل الفصل	125		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	3	15% (5)	Continuous	LO # 1-15
	Assignments	2	8% (4)	Continuous	LO # 1-15
	Projects / Lab.	1	12% (12)	Continuous	
	Report	1	5% (5)	Continuous	LO # 1-15
Summative assessment	**Midterm Exam**	3 hr	10% (10)	7,15	LO # 1-15
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج االسبوعي النظري	
	Material Covered
Week 1	Junction field-effect transistors (JFET) introduction
Week 2	Operation; background and V-I characteristics: JFET
Week 3	JFET biasing configuration
Week 4	JFET Low frequency incremental model
Week 5	JFET ac analysis Y parameters, h parameters
Week 6	JFET current source
Week 7	MOSFET definition
Week 8	MID term Examination
Week 9	MOSFET biasing configuration
Week 10	MOSFET ac analysis Y parameters, h parameters
Week 11	Multi stage amplifiers
Week 12	Cascading; Ideal impedances, cascoding
Week 13	Operational amplifiers; effect of finite open-loop gain
Week 14	Operational amplifiers circuits , inverting, non inverting, summing, differentiating
Week 15	Frequency response, gain-bandwidth product, output voltage swing, saturation
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج االسبوعي للمختبر	
	Material Covered
Week 1	JFET I-V characteristics
Week 2	JFET small signal amplifier
Week 3	JFET frequency response
Week 4	MOSFET characteristics
Week 5	MOSFET Negative Feedback
Week 6	Op-Amp Circuits; inverting, non-inverting
Week 7	Op-Amp Circuits; summing differentiating

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Electronic Devices and Circuit Theory Robert L Boylestad Louis Nashelsky Pearson 11th Edition, 2015	
Recommended Texts	Electronic Devices and Circuits Millman and Halkias Mc Graw Hill 4th Edition, 2015.	
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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Electronics II**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MDER220**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	2		**Semester of Delivery**	4	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Dr. Hussain Abed Jaber		**e-mail**	hussainjaber2000@nahrainuniv.edu.iq	
Module Leader's Acad. Title	Lecturer		**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	01/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية ألأخرى			
Prerequisite module	MDER120	**Semester**	3
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات إلرشادية	
Module Aims أهداف المادة الدراسية	1. Use intuition to describe the approximate time and frequency behavior of circuits containing energy storage elements. 2. Understand the concepts of employing simple models to represent non- linear and active elements-such as the MOSFET-in circuits. 3. Build circuits and take measurements of circuit variables using tools such as oscilloscopes, multimeters, and signal generators. Compare the measurements with the behavior predicted by mathematic models and explain the discrepancies. 4. Understand the relationship between the mathematical representation of circuit behavior and corresponding real-life effects. 5. Appreciate the practical significance of the systems developed in the course.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Design and compare biasing circuits for FET transistor amplifiers & explain the transistor switching. 2. Explain the concept of feedback, its types and design of feedback circuits 3. Design and analyze the operational amplifiers. 4. Design and analysis of FET and MOSFET amplifiers. 5. Determine the output produced by a circuit for a given set of inputs using the switch resistor model of a MOSFET. 6. Perform a small-signal analysis of an amplifier using small signal models for the circuit elements.
Indicative Contents المحتويات إلرشادية	Unit – I [25 hrs] **FET and JFET Transistors**: Introduction, device structures and physical operations, i-v characteristics, DC and AC load line, brief analysis as an amplifier. **MOS Field Effect Transistors**: Introduction, device structures and physical operations, i-v characteristics, brief analysis as an amplifier, and as a switch, Biasing, Unit-II [25 hrs] **FET and MOSFET circuits**: DC biasing; self-bias; feedback bias; voltage divider bias, fixed bias; AC analysis; Y-parameters analysis; H-parameters analysis **FET and MOSFET small signal operation:** models, single stage FET Amplifiers, MOSFET capacitances, common gate configuration; common source configuration; common drain configuration frequency response of CS amplifiers. Unit-III [25 hrs] **Amplifiers circuits:** MOS differential Pair, Small signal operation, frequency response of differential amplifier, Introduction to differential amplifier with active load. **Multistage amplifiers:** direct; capacitor coupled amplifier; cascade amplifier; cascode

	amplifier. **Operational amplifier (OpAmp):** Definition; structure design; inverting configuration; non-inverting configuration; summing amplifier; integration amplifier; differentiation amplifier.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Assessment is based on hand-in assignments, written exam, Case study, Quizzes, seminars, Practical testing and Online testing.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خالل الفصل	93	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خالل الفصل	32	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خالل الفصل	125		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	3	15% (5)	Continuous	LO # 1-15
	Assignments	2	8% (4)	Continuous	LO # 1-15
	Projects / Lab.	1	12% (12)	Continuous	
	Report	1	5% (5)	Continuous	LO # 1-15
Summative assessment	**Midterm Exam**	3 hr	10% (10)	7,15	LO # 1-15
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج االسبوعي النظري	
	Material Covered
Week 1	Junction field-effect transistors (JFET) introduction
Week 2	Operation; background and V-I characteristics: JFET
Week 3	JFET biasing configuration
Week 4	JFET Low frequency incremental model
Week 5	JFET ac analysis Y parameters, h parameters
Week 6	JFET current source
Week 7	MOSFET definition
Week 8	MID term Examination
Week 9	MOSFET biasing configuration
Week 10	MOSFET ac analysis Y parameters, h parameters
Week 11	Multi stage amplifiers
Week 12	Cascading; Ideal impedances, cascoding
Week 13	Operational amplifiers; effect of finite open-loop gain
Week 14	Operational amplifiers circuits , inverting, non inverting, summing, differentiating
Week 15	Frequency response, gain-bandwidth product, output voltage swing, saturation
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج االسبوعي للمختبر	
	Material Covered
Week 1	JFET I-V characteristics
Week 2	JFET small signal amplifier
Week 3	JFET frequency response
Week 4	MOSFET characteristics
Week 5	MOSFET Negative Feedback
Week 6	Op-Amp Circuits; inverting, non-inverting
Week 7	Op-Amp Circuits; summing differentiating

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Electronic Devices and Circuit Theory Robert L Boylestad Louis Nashelsky Pearson 11th Edition, 2015	
Recommended Texts	Electronic Devices and Circuits Millman and Halkias Mc Graw Hill 4th Edition, 2015.	
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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Engineering Mathematics**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MATH210**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	2		**Semester of Delivery**	3	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Ali M Miftin		**e-mail**	Ali.m.miftin@nahrainuniv.edu.iq	
Module Leader's Acad. Title	Lecturer		**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	26/08/2024		**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 أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	The student will study mathematical theories and application. On completion of this course the student will be able to: 1. Evaluate integrals that require certain techniques 2. Identify some kinds of series and do algebraic manipulations 3. Test the series for convergence 4. Find the inverse of a matrix and use matrices to solve simultaneously linear equations
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understand few kinds of techniques of integrations 2. Understand improper integrals and the transformation z=tan(x/2) 3. Understand Infinite Sequences and Series 4. Understand method used to test the Series 5. Understand the inverse of matrix and how to solve simultaneously linear equations
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A - Techniques of integrations Using Basic Integration Formulas, Integration by Parts, Trigonometric Integrals, Trigonometric Substitutions, Integration of Rational Functions by Partial Fractions, Improper Integrals. [25 hrs] Part B - Infinite Sequences and Series Sequences, Infinite Series, The Integral Test, Comparison Tests, Absolute Convergence; The Ratio and Root Tests, Alternating Series and Conditional Convergence, Power Series, Taylor and Maclaurin Series, Convergence of Taylor Series. [25 hrs] Part C - Matrices -Determinant of a Matrix-Inverse Of a matrix (operations on raws), Inverse Of a matrix (by minors, cofactors, Adj), Cramer rule. Singular matrices. [10 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Assessment is based on hand-in assignments, written exam, Quizzes.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
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% (5)	3, 12	LO #1,2,3,4,and 5
	Online Assignments	10	10% (1)	1,2,4,5,6,7,8, 10,11,13	All
	On site Assignments	2	10% (5)		
	Seminars	2	10% (5)		
Summative assessment	**Midterm Exam**	3 hr	10% (10)	9, 15	All
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Techniques of Integration -Using Basic Integration Formulas -Integration by Parts
Week 2	-Trigonometric Integrals

	Trigonometric Substitutions
Week 3	-Integration of Rational Functions by Partial Fractions -Improper Integrals
Week 4	Integration using the transformation z=tan(x/2)
Week 5	Infinite Sequences and Series -Sequences -Examples
Week 6	-Infinite Series -Examples
Week 7	-The Integral Test -Examples
Week 8	- Comparison Tests -Examples
Week 9	MID EXAM -Absolute Convergence; The Ratio and Root Tests -Examples
Week 10	-Alternating Series and Conditional Convergence -Examples
Week 11	-Power Series -Examples
Week 12	- Taylor and Maclaurin Series -Examples
Week 13	Matrices-Introduction
Week 14	-Determinant of a matrix -Inverse of a matrix (operations on rows) -Inverse of a matrix (by minors, cofactors, Adj.)

Week 15	Cramer rule and singular matrix MID EXAM
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Thomas' calculus : early Transcendentals	Yes
Recommended Texts		No
Websites	Microsoft Math soft MathCad Autograph	

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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Engineering Mechanics I**			**Module Delivery**	
Module Type	**Basic**			☒**Theory** ☐**Lecture** ☐**Lab** ☒**Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	**MDER211**				
ECTS Credits	**7**				
SWL (hr/sem)	**175**				
Module Level		UGII	**Semester of Delivery**		3
Administering Department		Type Dept. Code	**College**	Type College Code	
Module Leader	Dr. Aseel Mohammed Ali Hussein		**e-mail**	aseel.m.ali@nahrainuniv.edu.iq	
Module Leader's Acad. Title		Asst. Prof.	**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		01/06/2023	**Version Number**		1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	MATH110	**Semester**	one
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. Develop problem solving skills by applying principles of engineering, science, and mathematics. 2. Understand the principles of static equilibrium by applying Newton's laws of motion to solve engineering problems. 3. Determine the components of 2D forces and moments in rectangular coordinate systems. 4. Manipulate vector and geometric vectors to compute dot products, moments, and resultants as they relate to engineering problems. 5. Draw complete and correct free-body diagram(s) (including support reactions), then write and solve the appropriate equilibrium equations from the free-body diagram(s). 6. This course deals with topics include introduction to forces; 2D equilibrium of particles and rigid bodies; centre of gravity and centroids; friction; and analysis of frames. 7. Analyze equilibrium systems that include frictional forces. 8. Locate the centroid of composite bodies. 9. Calculate the moment of inertia for a given body and axes.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Define Newton's laws of motion. 2. Recall trigonometric laws and apply to the addition and decomposition of vectors quantities. 3. Identify the moment of a force and calculate its value about a specified axis. Define the moment of a couple. 4. Describe the concept of dry friction and analyse the equilibrium of rigid bodies subjected to this force. 5. Construct "Free Body Diagrams" of real world problems and apply Newton's Laws of motion and vector operations to evaluate equilibrium of particles and bodies. 6. Apply the principles of equilibrium of particles and bodies to analyse the forces in Frames and Machines. 7. Discuss the concepts of ``centre of gravity'' and ``centroids'' and compute their location for bodies of arbitrary shape. 8. Apply the concepts used for determining centre of gravity and centroids to find the resultant of a generally distributed loading. 9. Determine the moment of inertia of areas/masses and use the parallel-axis theorem for an area to find the moment of inertia about a specified axis

Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Basic concepts of mechanics; Scalars and vectors: Vector algebra and components; Position and unit vectors. Two-dimensional force systems; Moment of a force about a point; Moment of a force about a line. Equilibrium of a particle and the associated free-body diagrams; Equilibrium of a rigid body and the associated free body diagram. Two and three force members equilibrium in three dimensions; Internal forces developed in structural members; Frames and Machines. Theory of dry friction; Systems with friction; Wedges; Belt friction; Rolling resistance. Centre of gravity and centroid. Moment of inertia of areas/masses; Parallel-axis theorem for an area; Radius gyration of an area; Moments of areas/masses; Product of inertia for an area/mass.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The module is assessed through a combination of written coursework assignments and a two-hour formal examination scheduled during the mid of semester. The coursework takes a variety of formats, including essays and short questions and is designed to allow the students to evaluate their progress in the module in relation to the specified learning outcomes. This is achieved through feedback on the students. coursework and discussion of the coursework in subsequent lecture/tutorial classes. The examination paper typically has a choice of five questions from a possible six, covering all the learning outcomes.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	82	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.46
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	175		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	6	20% (10)	3, 4, 7, 12, 14	LO # 2, 3, 5, 7, 8, 9
	Assignments	2	20% (10)	1, 6, 8, 9, 10 1, 3, 4, 6, 7, 8, 9, 10, 11, 13	LO # ALL
	Projects / Lab.				
	Report				
Summative assessment	**Midterm Exam**	2 hr	10% (10)	5, 10, 15	LO # ALL
	Final Exam	3hr	50% (50)	16	LO # ALL
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Vectors & Matrices + Force systems: Two – dimensional force system
Week 2	Moment
Week 3	Couple
Week 4	Resultants
Week 5	Semester Examination 1 + Equilibrium
Week 6	Equilibrium
Week 7	Construction a free-body diagrams
Week 8	Structures: plane trusses, Structures: space trusses, Frames

Week 9	Friction
Week 10	Belts + Semester Examination 2
Week 11	Centroids
Week 12	Centroids + Moment of Inertia
Week 13	Moment of Inertia
Week 14	Moment of Inertia (Parallel-axis theorem for an area)
Week 15	Moment of Inertia (Parallel-axis theorem for an area) + Semester Examination 3
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Meriam, J. L., Kraige, L. G. & Bolton, J. N. (2008). Engineering Mechanics: Dynamics (SI). (6th ed.), Wiley.	Yes
Recommended Texts	Meriam, J. L., Kraige, L. G. & Bolton, J. N. (2017). Engineering Mechanics: Dynamics (SI). (8th ed.), Wiley. Meriam, J. L., Kraige, L. G. & & Bolton, J. N. (2017). Engineering Mechanics: Statics (SI). (7th ed.), Wiley.	Online
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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Engineering Mechanics II**			**Module Delivery**	
Module Type	**Basic**			☒**Theory** ☐**Lecture** ☐**Lab** ☒**Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	**MDER221**				
ECTS Credits	**6**				
SWL (hr/sem)	**125**				
Module Level		UGII	**Semester of Delivery**		4
Administering Department		Type Dept. Code	**College**	Type College Code	
Module Leader	Dr. Aseel Mohammed Ali Hussein		**e-mail**	aseel.m.ali@nahrainuniv.edu.iq	
Module Leader's Acad. Title		Asst. Prof.	**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		01/06/2023	**Version Number**		1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	MATH120	**Semester**	3
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. Develop problem solving skills by applying principles of engineering, science, and mathematics. 2. Understand the principles of dynamic by applying Newton's laws of motion to solve engineering problems. 3. applies the fundamental principles of kinematics and kinetics of rigid bodies to real world engineering problems.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Analyse both linear and angular displacements, velocities and accelerations of rigid bodies by applying the principles of kinematics. 2. Apply appropriate methods such as Newton's second law, work and energy principles, and impulse and momentum methods to analyse the effect of forces on two dimensional motion of rigid bodies. 3. Understand basic dynamics concepts – force, momentum, work and energy. 4. Understand and be able to apply Newton's laws of motion. 5. Learn to solve dynamics problems. Appraise given information and determine which concepts apply, and choose an appropriate solution strategy. 6. Gain an introduction to basic machine parts such as pulleys and mass-spring systems.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Basic concepts of Kinematics of particles; rectilinear motion. Plane curvilinear motion. Normal and tangential coordinates. relative motion. Kinetics of particles: Newton's second law. Rectilinear motion. Curvilinear motion. Work and kinetic energy. Impulse and momentum. Impact.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم

Strategies	The module is assessed through a combination of written coursework assignments and a two-hour formal examination scheduled during the mid of semester. The coursework takes a variety of formats, including essays and short questions and is designed to allow the students to evaluate their progress in the module in relation to the specified learning outcomes. This is achieved through feedback on the students. coursework and discussion of the coursework in subsequent lecture/tutorial classes. The examination paper typically has a choice of five questions from a possible six, covering all the learning outcomes.

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	32	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.1
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**	20	10% (10)	4, 6, 9, 12	LO # 1
	Assignments	20	10% (10)	3, 5, 8, 11 4, 6, 9, 12, 14	LO # 1 and 5
	Projects / Lab.				
	Report				
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7 + 13	LO # 1
	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 dynamics + applications of dynamics in biomedical engineering

Week 2	Kinematics of particles: rectilinear motion
Week 3	Plane curvilinear motion
Week 4	Plane curvilinear motion
Week 5	normal and tangential coordinates
Week 6	normal and tangential coordinates
Week 7	Semester Examination 1 + relative motion
Week 8	relative motion
Week 9	relative motion
Week 10	Kinetics of particles: Newton's second law
Week 11	Rectilinear motion
Week 12	Curvilinear motion
Week 13	Semester Examination 2 + Work and kinetic energy
Week 14	Impulse and momentum
Week 15	Impact
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**

Required Texts	J.L. Meriam, L.G. Kraige 2003, Engineering Mechanics (Dynamics) SI Version, 5th Ed., John Wiley and Sons Limited [ISBN: 978-1-118-08345-1]	Yes
Recommended Texts	J.L. Meriam, L.G. Kraige 2018, Engineering Mechanics (Dynamics) SI Version, 8th Ed., John Wiley and Sons Limited [ISBN: 978-1-118-08345-1]	Online
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.

Course Description Form

1. Course Name: BONE INJURY &FRACTURES

2. Course Code: MDER 325

3. Semester / Year: 2nd semester \ 3rd year.

4. Description Preparation Date: 20\5 \2025

5. Available Attendance Forms: Attendance only

6. Number of Credit Hours (Total) / Number of Units (Total): 30 hour \ 2 unit

7. Course administrator's name (mention all, if more than one name)

Name: Dr. Eman Ghadhban Khalil
Email: eman.g.khalil@nahrainuniv.edu.iq

8. Course Objectives

Course Objectives	The student will be able : 1-To understand the normal& abnormal bone structure. 2-- To understand causes ,pathogenesis of bone diseases . 3-To understand bone healing &repair after fractures 4- learning the outcome of the diseases &how they are managed. 5-To learn principles of diagnostic techniques in pathology . 6-To developing professional capabilities of students.

9. Teaching and Learning Strategies

Strategy	Theoretical lectures, pdf, illustrations , educational videos , discussions for: -Knowledge and Understanding **the normal structure of bone tissue & abnormal(diseased) bone tissue, causes, pathogenes** -Develop Subject-specific skills **about outcome of the diseases &how they are managed.** -Enhance Thinking Skills about **diagnostic techniques in pathology .** **-Develop professional capabilities of students.**

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	The student will be able : -To Knowledge & understand the normal& abnormal bone structure. -To understand causes ,pathogenesis of bone diseases . -To understand bone healing &repair after fractures - learning the outcome of diseases &how they managed. -To learn principles diagnostic techniques pathology . -To develop the professio medical engineering capabilities of students in the field of diagnostic devices & technologies.	Orthopedic pathology, Bone ,components :bone matrix &bone cells .bone anatomy. periosteum& endosteum. Types of bones : compact & spongy bones , primary immature woven bones & secondary mature lamellar bones. Components of compact & spongy bones. Blood &nerve supply of bone	Theoretical lectures, illustrations educational videos , discussions	discussions

2	2	-To understand the normal structure of bone -To understand bone healing &repair processes	.The synovium Bone formation Bone Cells & Bone remodeling	Theoretical lectures,pdf, illustrations educational videos , discussions	homework +quiz +discussions Written exam
3	3	To develop the professional medical engineering capabilities of students in the field of diagnostic devices & technologies.	SCIENTIFIC TRIP		
4	2	To Knowledge &understand causes ,pathogenesis of bone diseases **micr&macroscopic pathological changes of bone diseases** -learning the outcome of diseases &how they managed. -To learn principles diagnostic techniques . -To develop professional medical engineer capabilities of of students	Bone Necrosis, Avascular bone necrosis, bone infection, complications. acute osteomyelitis	Theoretical lectures,pdf, illustrations educational videos , discussions	=
5	2	To Knowledge & understand causes ,pathogenesis of bone diseases . -To understand bone healing &repair in TB - learning the outcome of diseases &how they managed. -To learn principles diagnostic techniques -To developing	Tuberculosis of bones & joints Subperiosteal haematoma	=	=

		professional capabilities of students.			
6	2	To Knowledge & understand causes ,pathogenesis of bone diseases **micro & macroscopic pathological changes of bone diseases** -learning the outcome of diseases &how they managed. -To learn principles diagnostic techniques -To developing professional capabilities of students.	Metabolic bone diseases; osteoporosis .pathophysiology osteoporosis .contributors to bone strength . -diseases & medications associated with decreased bone mass.	=	=
7	2	To Knowledge &understand causes ,pathogenesis of bone diseases . **micr&macroscopic pathological changes of bone diseases** - learning the outcome of diseases &how they managed. -To learn principles diagnostic techniques -To developing professional capabilities of students.	Osteomalacia &Rickets, Paget disease, cau .pathogenesis, investigations diagnosis	=	=
8	2	To Knowledge &understand	Hyper-	=	=

		causes ,pathogenesis of bone diseases . **micr&macroscopic pathological changes of bone diseases** - learning the outcome of diseases &how they managed. -To learn principles diagnostic techniques -To developing professional capabilities of students.	Parathyroidisim, .Calcium homeostasis		
9	2		1ST MID EXAM		
10	2	To Knowledge & understand the normal& abnormal bone structure due to different influencing factors To understand the process of bone-healing &repair after fractures - learning the outcome of diseases &how they managed. -To learn principles diagnostic techniques -To developing professional capabilities of students.	Bone Fracture physiology . Bone healing. Events following fractures Factors influenc healing of fractures complications. Pathological fracture.	=	=

11	2	**To** Knowledge &**understand causes, pathogenesis, micr&macroscopic pathological changes of bone diseases.** -learning the outcome of diseases &how they managed. -To learn principles diagnostic techniques -To developing professional capabilities of students	Fibrous dysplasia bone, Paget s disease bone	=	=
12	2	**To** Knowledge &**understand causes, pathogenesis, micr&macroscopic pathological changes of bone diseases.** -learning the outcome of diseases &how they managed. -To learn principles diagnostic techniques -To developing professional capabilities of students	-Osteoarthritis, Immuno-pathological joint diseases; Rheumatoid arthritis. Systemic Lupus Erythematosus.	=	=
13	3	**To** Knowledge &**understand causes, pathogenesis, micr&macroscopic pathological changes of bone diseases.** -Learning the outcome of diseases &how they managed. -To learn principles diagnostic techniques -To developing professional capabilities of students	Acute Rheumatic Fever . Systemic Sclerosis. Gout& Gouty arthritis. Pseudogou . Turner s Syndrome, Intervertebral disc disease. 2nd mid exam	=	=
14	2	**To** Knowledge &**understand causes, pathogenesis, micr&macroscopic pathological**	Bone tumors: types, causes, risk factors, ,diagnosis,	=	discussion

		changes of bone diseases. learning the outcome of diseases &how they managed. -To learn principles diagnostic techniques -To developing professional capabilities of students	staging +SIMINARES		
15			Final exam		

11. Course Evaluation

The overall grade for the subject is 100%, divided as follows:

40% (rate of 25% for first and second midterm exams + 5% daily tests + 5% seminars + 5% attendance)
+
60% (comprehensive theoretical exam for the entire subject)

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	1-Robbins Pathologic basis of disease. 2-Curran s Atlas of Histopathology .4th edition. 3-Davidson s Principles & practice of medicine 22 st edition 4- Pathologic-Basis-Of-Disease-Third-Edition
Main references (sources)	principles of anatomy and physiol 12th ed - g. tortora, b
Recommended books and references (scientific journals, reports…)	scientific journals related to b diseases.
Electronic References, Websites	

Course Description Form

1. Course Name: BONE INJURY &FRACTURES

2. Course Code: MDER 325

3. Semester / Year: 2nd semester \ 3rd year.

4. Description Preparation Date: 20\5 \2025

5. Available Attendance Forms: Attendance only

6. Number of Credit Hours (Total) / Number of Units (Total): 30 hour \ 2 unit

7. Course administrator's name (mention all, if more than one name)

Name: Dr. Eman Ghadhban Khalil
Email: eman.g.khalil@nahrainuniv.edu.iq

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Strategy	Theoretical lectures, pdf, illustrations , educational videos , discussions for: -Knowledge and Understanding **the normal structure of bone tissue & abnormal(diseased) bone tissue, causes, pathogenes** -Develop Subject-specific skills **about outcome of the diseases &how they are managed.** -Enhance Thinking Skills about **diagnostic techniques in pathology .** **-Develop professional capabilities of students.**

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	The student will be able : -To Knowledge & understand the normal& abnormal bone structure. -To understand causes ,pathogenesis of bone diseases . -To understand bone healing &repair after fractures - learning the outcome of diseases &how they managed. -To learn principles diagnostic techniques pathology . -To develop the professio medical engineering capabilities of students in the field of diagnostic devices & technologies.	Orthopedic pathology, Bone ,components :bone matrix &bone cells .bone anatomy. periosteum& endosteum. Types of bones : compact & spongy bones , primary immature woven bones & secondary mature lamellar bones. Components of compact & spongy bones. Blood &nerve supply of bone	Theoretical lectures, illustrations educational videos , discussions	discussions

2	2	-To understand the normal structure of bone -To understand bone healing &repair processes	.The synovium Bone formation Bone Cells & Bone remodeling	Theoretical lectures,pdf, illustrations educational videos , discussions	homework +quiz +discussions Written exam
3	3	To develop the professional medical engineering capabilities of students in the field of diagnostic devices & technologies.	SCIENTIFIC TRIP		
4	2	To Knowledge &understand causes ,pathogenesis of bone diseases **micr&macroscopic pathological changes of bone diseases** -learning the outcome of diseases &how they managed. -To learn principles diagnostic techniques . -To develop professional medical engineer capabilities of of students	Bone Necrosis, Avascular bone necrosis, bone infection, complications. acute osteomyelitis	Theoretical lectures,pdf, illustrations educational videos , discussions	=
5	2	To Knowledge & understand causes ,pathogenesis of bone diseases . -To understand bone healing &repair in TB - learning the outcome of diseases &how they managed. -To learn principles diagnostic techniques -To developing	Tuberculosis of bones & joints Subperiosteal haematoma	=	=

		professional capabilities of students.			
6	2	To Knowledge & understand causes ,pathogenesis of bone diseases **micro & macroscopic pathological changes of bone diseases** -learning the outcome of diseases &how they managed. -To learn principles diagnostic techniques -To developing professional capabilities of students.	Metabolic bone diseases; osteoporosis .pathophysiology osteoporosis .contributors to bone strength . -diseases & medications associated with decreased bone mass.	=	=
7	2	To Knowledge &understand causes ,pathogenesis of bone diseases . **micr&macroscopic pathological changes of bone diseases** - learning the outcome of diseases &how they managed. -To learn principles diagnostic techniques -To developing professional capabilities of students.	Osteomalacia &Rickets, Paget disease, cau .pathogenesis, investigations diagnosis	=	=
8	2	To Knowledge &understand	Hyper-	=	=

		causes ,pathogenesis of bone diseases . **micr&macroscopic pathological changes of bone diseases** - learning the outcome of diseases &how they managed. -To learn principles diagnostic techniques -To developing professional capabilities of students.	Parathyroidisim, .Calcium homeostasis		
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11	2	**To** Knowledge &**understand causes, pathogenesis, micr&macroscopic pathological changes of bone diseases.** -learning the outcome of diseases &how they managed. -To learn principles diagnostic techniques -To developing professional capabilities of students	Fibrous dysplasia bone, Paget s disease bone	=	=
12	2	**To** Knowledge &**understand causes, pathogenesis, micr&macroscopic pathological changes of bone diseases.** -learning the outcome of diseases &how they managed. -To learn principles diagnostic techniques -To developing professional capabilities of students	-Osteoarthritis, Immuno-pathological joint diseases; Rheumatoid arthritis. Systemic Lupus Erythematosus.	=	=
13	3	**To** Knowledge &**understand causes, pathogenesis, micr&macroscopic pathological changes of bone diseases.** -Learning the outcome of diseases &how they managed. -To learn principles diagnostic techniques -To developing professional capabilities of students	Acute Rheumatic Fever . Systemic Sclerosis. Gout& Gouty arthritis. Pseudogou . Turner s Syndrome, Intervertebral disc disease. 2nd mid exam	=	=
14	2	**To** Knowledge &**understand causes, pathogenesis, micr&macroscopic pathological**	Bone tumors: types, causes, risk factors, ,diagnosis,	=	discussion

		changes of bone diseases. learning the outcome of diseases &how they managed. -To learn principles diagnostic techniques -To developing professional capabilities of students	staging +SIMINARES		
15			Final exam		

11. Course Evaluation

The overall grade for the subject is 100%, divided as follows:

40% (rate of 25% for first and second midterm exams + 5% daily tests + 5% seminars + 5% attendance)
+
60% (comprehensive theoretical exam for the entire subject)

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Required textbooks (curricular books, if any)	1-Robbins Pathologic basis of disease. 2-Curran s Atlas of Histopathology .4th edition. 3-Davidson s Principles & practice of medicine 22 st edition 4- Pathologic-Basis-Of-Disease-Third-Edition
Main references (sources)	principles of anatomy and physiol 12th ed - g. tortora, b
Recommended books and references (scientific journals, reports…)	scientific journals related to b diseases.
Electronic References, Websites	

Course Description Form

Biomedical Engineering Department

1. Course Name:

Engineering Statistics

2. Course Code:

CREQ320

3. Semester / Year:

2nd Semester / Third Year / 2024-2025

4. Description Preparation Date:

20-1-2025

5. Available Attendance Forms:

Attendance, only

6. Number of Credit Hours (Total) / Number of Units (Total)

2 hours / week, 2 units, total =3 hr

7. Course administrator's name (mention all, if more than one name)

Name: Asst. Lec. Zaid Mustafa Khudair
Email: zaid.mustafa.kh@nahrainuniv.edu.iq

8. Course Objectives

1. Understanding Basic Statistical Concepts: The module aims to introduce students to fundamental statistical concepts such as data types, variables, population, sample, descriptive statistics, and probability.
2. Data Collection and Sampling: Students learn about different methods of data collection, including surveys, experiments, and observational studies. They also understand the importance of sampling techniques and how to select an appropriate sample for analysis.
3. Exploratory Data Analysis: The module aims to teach students how to explore and summarize data using graphical and numerical techniques. They learn how to create histograms, box plots, scatter plots, and compute summary statistics such as mean, median, and standard deviation.
4. Probability Theory: Students gain an understanding of probability concepts, including basic principles, conditional probability, independence, and Bayes' theorem. They learn how to calculate probabilities and apply them in real-world scenarios.
5. Statistical Inference: The module aims to introduce students to the process of making inferences about populations based on sample data. They learn about confidence intervals and hypothesis testing, including concepts like null and alternative hypotheses, p-values, and significance levels.

6. Regression Analysis: Students are taught the basics of regression analysis, including simple linear regression and multiple regressions. They learn how to build regression models, interpret coefficients, assess model fit, and make predictions.
7. Statistical Software: Many statistics modules include an element of practical work using statistical software such as R, Python, or SPSS. The aim is to familiarize students with the tools used for data analysis, data visualization, and statistical modeling.
8. Critical Thinking and Interpretation: The module aims to develop students' critical thinking skills by teaching them how to interpret statistical results and draw meaningful conclusions. They learn to evaluate the strengths and limitations of statistical analyses and make informed decisions based on data.
9. Ethical Considerations: Some statistics modules incorporate discussions on ethical considerations in data analysis and research. Students explore topics such as data privacy, bias, and the responsible use of statistics.
10. Overall, the aims of a statistics module are to provide students with a solid foundation in statistical concepts, methods, and applications. It equips them with the necessary skills to analyze data, draw meaningful conclusions, and make informed decisions in various fields of study and professional settings.

9. Teaching and Learning Strategies

Assessment is based on hand-in assignments, written exam, Case study, Quizzes, seminars, Practical testing , When it comes to learning and teaching statistics, there are various strategies that can be effective in helping students grasp the concepts and develop a strong foundation in statistical reasoning. Here are some strategies for both learning and teaching statistics:

Learning Strategies:

1. Start with the Basics: Begin by understanding the fundamental concepts and principles of statistics, such as measures of central tendency, variability, and probability. Build a solid foundation before moving on to more complex topics.
2. Active Learning: Actively engage with the material by participating in discussions, solving problems, and working on hands-on activities. This can include analyzing real-world data sets, conducting experiments, or using statistical software.
3. Visualize Data: Statistics often involve working with data, and visual representations like graphs, charts, and diagrams can enhance understanding. Interpret and create visuals to see patterns, trends, and relationships in data.
4. Practice Problems: Regularly solve practice problems to reinforce understanding and apply concepts. Work through a variety of problem types to gain a comprehensive understanding

of statistical techniques.

5. Real-World Applications: Connect statistical concepts to real-world applications and examples. This helps in understanding how statistics are used in various fields such as business, economics, healthcare, and social sciences.

Teaching Strategies:

1. Clear Explanation: Start by providing a clear and concise explanation of statistical concepts, using simple language and relatable examples. Break down complex ideas into smaller, manageable parts.
2. Demonstrate Procedures: Show step-by-step procedures for solving statistical problems. Demonstrate calculations, formulas, and the use of statistical software or calculators.
3. Engage in Discussions: Encourage active participation and discussion in the classroom. Ask questions, prompt students to share their ideas, and facilitate peer-to-peer learning. This promotes critical thinking and a deeper understanding of statistical concepts.
4. Use Technology: Utilize statistical software packages like SPSS, R, or Excel to demonstrate data analysis and visualization techniques. Incorporate interactive online tools or simulations to enhance learning experiences.
5. Real-World Examples: Connect statistical concepts to real-world scenarios that students can relate to. Provide examples from different domains, such as sports, healthcare, social issues, or marketing, to illustrate the practical applications of statistics.
6. Formative Assessment: Regularly assess student understanding through quizzes, assignments, or short tests. Provide constructive feedback to guide their learning and address any misconceptions.
7. Practical Projects: Assign projects that involve collecting, analyzing, and interpreting real or simulated data. This allows students to apply statistical concepts in a meaningful and hands-on way.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Understanding Basic Statistical Concepts	Fundamentals (Introduction to Statistics)	Lecture	-
2	2	Understanding Basic Statistical Concepts	Presentation of Statistical Data	Lecture	Homework

3	2	Apply statistical methods	Data Description (Part 1)	Lecture and classroom discussion	Homework
4	2	Data Collection and Sampling, Interpret and communicate statistical results	Data Description (Part 2)	Lecture and classroom discussion	Quiz
5	2	understanding of probability concepts, including basic principles, conditional probability, independence	Probability	Lecture	Discussion in the classroom
6	2	understanding of probability concepts, including basic principles, conditional probability, independence	Probability and Counting Rules	Lecture	Discussion in the classroom
7	2	Critical Thinking and Interpretation	Discrete Probability Distributions	Lecture and classroom discussion	Quiz
8	2	Exam	FIRST MIDTERM EXAM	Exam	Mid Term Exam
9	2	Critically evaluate statistical information	Continuous Distribution	Lecture	Discussion in the classroom
10	2	Critically evaluate statistical information	Continuous Distribution	Lecture	Homework
11	2	probability concepts, including basic principles, conditional probability, independence	Hypothesis Testing	Lecture	Classwork
12	2	probability concepts, including basic principles, conditional probability, independence	Testing the Difference Between Two Means, Two Proportions, and Two Variances	Lecture	Homework

13	2	Critically evaluate statistical information	Correlation and Regression	Lecture and classroom discussion	Discussion in the classroom
14	2	Exam	SECOND MIDTERM EXAM	Exam	Mid Term Exam
15	Preparation for the final exam				

11.Course Evaluation	
Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, Homework.... etc.	
12.Learning and Teaching Resources	
Required Texts	"Statistics for Business and Economics" by Paul Newbolt, William L. Carlson, and Betty Thorne: This book focuses on applying statistical methods to business and economics. It covers topics such as regression analysis, hypothesis testing, and time series analysis.
Main references (sources)	bluman-step-by-step-statistics-8th-edition
Electronic References, Websites	1. Stat Trek (stattrek.com): Stat Trek is an online statistics tutorial site. It offers a comprehensive set of lessons covering various statistical concepts, along with interactive calculators and quizzes. 2. UCLA Statistical Consulting Group (stats.idre.ucla.edu): UCLA's Statistical Consulting Group provides an extensive collection of resources, including tutorials, examples, and guides for statistical software like R, SAS, and SPSS. 3. Khan Academy Statistics (khanacademy.org/math/statistics-probability): Khan Academy's statistics section is a free online resource with video lessons and interactive exercises. It covers a wide range of topics, from basic probability to inferential statistics.

Course Description Form

1. Course Name:
Medical Equipment I
2. Course Code:
MDER316
3. Semester / Year:
1^{st} semester/ 3^{rd} year
4. Description Preparation Date:
25\5\2025
5. Available Attendance Forms:
Attendance only
6. Number of Credit Hours (Total) / Number of Units (Total)
60 hours in the semester/3 units
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Mais Odai Abdul Rassul AL-Saffar Email: mais.o.abdulrassul@nahrainuniv@edu.iq
8. Course Objectives

Course Objectives	• Enable students to be able to understand the main functions Imaging instruments • Enable students to identify t importance of these instruments • To make students able to handle imaging instruments • Enable students to be able to understand the main functions of imaging instruments
9. Teaching and Learning Strategies	
Strategy	Theoretical study: (theoretical lectures supported by modern means of presentation and reinforced with the latest scientific sources and holding seminars in which students participate). Practical study: (teaching students to use different instruments)

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	X-ray	History	Theoretical scientific lectures scientific / or interactive media presentations	Oral questions during the lecture
2	4	X-ray	Introduction	Theoretical scientific lectures scientific / or interactive media presentations	Oral questions during the lecture
3	4	X-ray	X-ray tube Components	Theoretical scientific lectures scientific / or interactive media presentations	Oral questions during the lecture
4	4	X-ray	Types of anodes	Theoretical scientific lectures scientific / or interactive media presentations	Oral questions during the lecture
5	4	Mid Exam I			Mid Exam I
6	4	X-ray	Main X-Ray Circuit	Theoretical scientific lectures scientific / or interactive media presentations	Oral questions during the lecture
7	4	X-ray	Rectification	Theoretical scientific lectures scientific / or interactive media presentations	Oral questions during the lecture
8	4	X-ray	Image Detection	Theoretical scientific lectures scientific / or interactive media presentations	Oral questions during the lecture
9	4	X-ray	Contrast Media Examinations	Theoretical scientific lectures scientific / or interactive media presentations	Oral questions during the lecture
10	4	X-ray	Radiography Terminology	Theoretical scientific lectures scientific / or interactive media presentations	Oral questions during the lecture
11	4	Mid exam II			Mid Exam II
12	4	CT	Principle and Mechanism of CT	Theoretical scientific lectures scientific / or interactive media presentations	Oral questions during the lecture
13	4	CT	Generations of CT	Theoretical scientific lectures scientific / or interactive media presentations	Oral questions during the lecture
14	4	CT	Spiral/helical CT	Theoretical scientific lectures scientific	Oral questions during the lecture
15	4	CT	Detectors' types	Theoretical scientific lectures scientific / or interactive media presentations	Oral questions during the lecture

11. Course Evaluation

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

20 marks Midterm

15 marks practical

5 marks Quizzes

Final (60%)

12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Biomedical Technology and Devices Handbook, By James Moore, George Zouridakis
Main references (sources)	1. The Biomedical Engineering Handboo By Josef D. Bronzino. 2. Biomedical Technology and Devic Handbook, By James Moore, Geor Zouridakis. 3. Medical Imaging Physics, By William Hendee, E. Russell Ritenour
Recommended books and references (scientific journals, reports…)	Medical Imaging Physics, By William Hendee, E. Russell Ritenour
Electronic References, Websites	Research gate

Course Description Form

1. Course Name:
Medical Equipment II
2. Course Code:
MDER324
3. Semester / Year:
2^{nd} semester/ 3^{rd} year
4. Description Preparation Date:
25\5\2025
5. Available Attendance Forms:
Attendance only
6. Number of Credit Hours (Total) / Number of Units (Total)
30 hours in the semester/2
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Mais Odai Abdul Rassul AL-Saffar Email: mais.o.abdulrassul@nahrainuniv@edu.iq
8. Course Objectives

Course Objectives	This course aims at providing the student with the necessary basic and advanced concepts for the followings: 1. General Medical Instrumentation Block Diagram. 2. Physics of the MRI. 3. Physics of the Nuclear Medicine Imaging. 4. Advanced Techniques and processing of Building the Data in MRI. 5. Measurements and other useful tools manipulating medical image in both NMI and MRI.

9. Teaching and Learning Strategies

Strategy	Theoretical study: (theoretical lectures supported by modern means of presentation and reinforced with the latest scientific sources and holding seminars in which students participate). Practical study: (teaching students to use different instruments)

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	MRI	Principle and Mechanism of MRI	Theoretical scientific lectures scientific / or interactive media presentations	Oral questions during the lecture
2	2	MRI	Fundamentals of MRI Instrumentation and Controlling	Theoretical scientific lectures scientific / or interactive media presentations	Oral questions during the lecture
3	2	MRI	Hardware Components of MRI Scanner and cooling system	Theoretical scientific lectures scientific / or interactive media presentations	Oral questions during the lecture
4	2	MRI	MRI Rooms and System Components	Theoretical scientific lectures scientific / or interactive media presentations	Oral questions during the lecture
5	2	Mid Exam I			Mid Exam I
6	2	MRI	Types of MRI: Echo planar imaging, Magnetic resonance angiography, Interventional MRI and Functional MRI.	Theoretical scientific lectures scientific / or interactive media presentations	Oral questions during the lecture
7	2	MRI	Biological effect of NMR	Theoretical scientific lectures scientific / or interactive media presentations	Oral questions during the lecture
8	2	Nuclear Medicine	Principles of NMI	Theoretical scientific lectures scientific / or interactive media presentations	Oral questions during the lecture
9	2	Nuclear Medicine	Physics of radioactivity	Theoretical scientific lectures scientific / or interactive media presentations	Oral questions during the lecture
10	2	Nuclear Medicine	Radioisotopes used in Medicine and Manufacturing	Theoretical scientific lectures scientific / or interactive media presentations	Oral questions during the lecture
11	2	Mid exam II			Mid Exam II
12	2	Nuclear Medicine	Gamma-ray Detector and Instruments in (NMI)	Theoretical scientific lectures scientific / or interactive media presentations	Oral questions during the lecture
13	2	Nuclear Medicine	Hardware Components of an NMI	Theoretical scientific lectures scientific / or interactive media presentations	Oral questions during the lecture
14	2	Nuclear Medicine	ECT	Theoretical scientific lectures scientific	Oral questions during the lecture
15	2	Nuclear Medicine	SPECT and PET	Theoretical scientific lectures scientific / or interactive media presentations	Oral questions during the lecture

11. Course Evaluation

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

35 marks Midterm

5 marks Quizzes

Final Exam (60%)

12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Biomedical Technology and Devices Handbook, By James Moore, George Zouridakis
Main references (sources)	1. The Biomedical Engineering Handboo By Josef D. Bronzino. 2. Biomedical Technology and Devic Handbook, By James Moore, Geor Zouridakis. 3. Medical Imaging Physics, By William Hendee, E. Russell Ritenour
Recommended books and references (scientific journals, reports…)	Medical Imaging Physics, By William Hendee, E. Russell Ritenour
Electronic References, Websites	Research gate

Course Description Form

1. Course Name:

Head & Neck Anatomy

2. Course Code:

MDER322

3. Semester / Year:

2nd Semester /Third year/ 2024-2025

4. Description Preparation Date:

28.1.2025

5. Available Attendance Forms:

Attendance, only

6. Number of Credit Hours (Total) / Number of Units (Total)

4 hours / week, 3 units, total =60 hr

7. Course administrator's name (mention all, if more than one name)

Name: Assis. Prof. Dr. Rana I. Mahmood
Email: rana.i.mahmood@nahrainuniv.edu.iq

8. Course Objectives

Course Objectives	• This course will provide the students with the basic knowledge of human anatomy in the context of macroscopy and microscopic structure, mechanics and function. • The focus is on the healthy body, with reference to diseases and ageing. • It provides basic biological knowledge in human systems for bioengineering applications.

9. Teaching and Learning Strategies

Strategy	1. Using questions and inquiries that are distinguished by depth and accuracy. 2. Simulating the student towards understanding the cause and effect. 3. Increasing the student's ability to express the problems and expression

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	Study the anatomy of skull - organization bones	The skull - organization & bones The skull – cranial fossa & foramens	Lecture	Homework
2	4	Study the anatomy of the Scalp & face - muscles & vessels, Cranial Meninges	Scalp & face - muscles & vessels, Cranial Meninges	Lecture	Quiz
3	4	Study the anatomy of the Orbit cavity & eye	Orbit & eye	Lecture and classroom discussion	Discussion in classroom
4	4	Study the anatomy of	Nose & paranasal sinus	Lecture	Quiz

		the Nose & paranasal sinuses			
5	4	Study the anatomy of the The ear	The ear	Lecture	Discussion in the classroom
6	2	An examination of the first fifth lectures	FIRST MIDTERM EXAM	Exam	Mid Term Exam
7	4	Study the anatomy of the Oral cavity - teeth & tongue	Oral cavity - teeth & tongue	Lecture and classroom discussion	Class participation
8	4	Study the anatomy of the The upper & lower jaws, salivary glands, muscles of mastigation and tempro - mandibular joint	The upper & lower jaws, salivary glands, muscles of mastigation and temporo - mandibular joint	Lecture and classroom discussion	Quiz
9	4	Study the anatomy of the The neck - organization & major vessels, neck viscera, and cranial vertebrae	The neck - organization & major vessels, neck viscera, and cranial vertebrae	Lecture	Class participation
10	4	Study the anatomy of the Pharynx & Larynx	Pharynx & Larynx	Lecture	Discussion in the classroom
11	4	Parts & divisions of the nervous system, gross anatomy of central nervous system (CNS), functional localization in the cerebrum, blood supply of the CNS, meninges CSF & ventricles, diencephalon, limbic system, cerebellum & basal ganglia, spinal cord.	Neuroanatomy	Exam	Mid Term Exam
12	4	An examination of the 7-11 lectures	Mid – Term Theoretical Exam	Lecture and classroom discussion	Class participation
13	4	Seminars about different diseases related to the topics	Seminars	Presentations	Presentations

		covered in this course			
14	4		Final Practical Exam	Exam	Practical Exam
15	Preparation for the final exam				

1. Course Evaluation

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

2. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Seeley R. R.; Stephens T. D. & Tate P. (1998) Anatomy & Physiology, fourth edition. Moore K. L. &Dalley A. f. (1999). Clinically Oriented Anatomy, fourth edition.
Main references (sources)	Tortora G. J. Principles of Human Anatomy, tenth edition; 2005.
Recommended books and references (scientific journals, reports...)	Snell R. S. (1976). An Atlas of Normal Radiographic Anatomy, first edition.3
Electronic References, Websites	https://www.kenhub.com/

Course Description Form

1. Course Name:

Mechanics of Materials I

2. Course Code:

MDER311

3. Semester / Year:

1st semester/ 3rd year

4. Description Preparation Date:

12/9/2023

5. Available Attendance Forms:

Attendance, only

6. Number of Credit Hours (Total) / Number of Units (Total)

3 hr per week/ 45 hr per Semester/ 2 Units

7. Course administrator's name (mention all, if more than one name)

Name: Dr Aseel Mohammed Ali Hussein
Email: aseel.m.ali@nahrainuniv.edu.iq

8. Course Objectives

Course Objectives	A thorough understanding of structural members and their strength, stiffness, and stabil Develop an understanding of, and the capability to, solve practical engineering proble involving stress and strain analysis in elementary structural members, such as bars and bea A thorough understanding of concepts related to strength, stiffness, and stability of structu needed for engineering analysis and design. Develop the capability to design new struct members based on strength and stiffness requirements. Develop the capability to check verify the safety of existing or designed structures.

9. Teaching and Learning Strategies

Strategy	Lectures supported by modes developing material covered in lectures. These modes incl problem-solving tutorials

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1-3	3	Apply stress-strain relations conjunction with elasticity material properties.	Simple Stress and Strain	Lecture	Assignment
4-6	3	Determine the stresses in compound bars.	Compound Bars	Lecture	Assignment
7	3		Semester Examination 1		
8-10	3	Computation of shear stresses and bending moment acting on structure.	Beams Bending Moments Shear Force Diagrams	Lecture	Assignment
11-13	3	Design and Analysis of beams u pure bending loads	Bending Stresses in Beams	Lecture	Assignment
14	3		Semester Examination 2		
15	3	Cumulative review for stressand st problems&SF and BM diagrams			

11. Course Evaluation

The module is assessed through a combination of written coursework assignments and a two-hour formal examination scheduled during the mid of semester. The coursework takes a variety of formats, including essays and short questions and is designed to allow the students to evaluate

their progress in the module in relation to the specified learning outcomes. This is achieved through feedback on the students. coursework and discussion of the coursework in subsequent lecture/tutorial classes. The examination paper typically has a choice of five questions from a possible six, covering all the learning outcomes.

12.Learning and Teaching Resources

Required textbooks (curricular books, if any	Mechanics of Materials, Hearn,2nd edition, Perjan press,1985
Main references (sources)	
Recommended books and references (scientific journals, reports...)	1. Strength of Materials, R. S. Khurmi, 1st editi 1968. 2. Schaum's Outline of Strength of Materials, Na W. and Potter, M., 2011.
Electronic References, Websites	

Course Description Form

1. Course Name:
Mechanics of Materials II
2. Course Code:
MDER321
3. Semester / Year:
2nd semester/ 3rd year
4. Description Preparation Date:
28/1/2024
5. Available Attendance Forms:
Attendance, only
6. Number of Credit Hours (Total) / Number of Units (Total)
3 hr per week/ 60 hr per Semester/ 3 Units
7. Course administrator's name (mention all, if more than one name)
Name: Dr Aseel Mohammed Ali Hussein Email: aseel.m.ali@nahrainuniv.edu.iq
8. Course Objectives

Course Objectives	Study the slope and deflection of beams, shearing stresses and beams, torsion of circular sha and thin cylinders and shells.

9. Teaching and Learning Strategies

Strategy	Lectures supported by modes developing material covered in lectures. These modes incl problem-solving tutorials

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Determinate beams and structu Beam deflection; Methods for slop and deflection.	Slope and Deflection Beams	Lecture	Discussion
2	3	Develop adequate procedures for finding the required dimensions of member of a specified material to carry a given load subject to stated specification stress and deflection	Slope and Deflection of Beams	Lecture	Discussion
3	3	Develop adequate procedures finding the required dimensions member of a specified material to c a given load subject to st specifications of stress and deflect	Slope and Deflection of Beams	Lecture	Discussion
4	3	Determinate beams and structu Beam deflection; Method determining shear stress.	Shearing Stresses and Bea	Lecture	Discussion
5	3	Determinate beams and structu Beam deflection; Method determining shear stress.	Shearing Stresses and Bea	Lecture	Discussion
6	3	Determinate beams and structu Beam deflection; Method determining shear stress.	Shearing Stresses and Bea	Lecture	Discussion
7	3		Semester Examination 1		

8	3	Review of direct stress, flex formula and torsion formula; U	Torsion of Circular Shafts	Lecture	Discussion
9		Review of direct stress, flex formula and torsion formula; U	Torsion of Circular Shafts	Lecture	Discussion
10		Review of direct stress, flex formula and torsion formula; U	Torsion of Circular Shafts	Lecture	Discussion
11	3	Design and Analysis of beams	Torsion of Circular Shafts	Lecture	Discussion
12		Transformation of stresses; Princ stresses and maximum shear str Mohr's circles.	Thin Cylinders and Shells	Lecture	Discussion
13		Transformation of stresses; Princ stresses and maximum shear str Mohr's circles.	Thin Cylinders and Shells	Lecture	Discussion
14	3		Semester Examination 2		
15	3	Cumulative review for stress and st problems & SF and BM diagrams		Lecture	

11.Course Evaluation

The module is assessed through a combination of written coursework assignments and a two-hour formal examination scheduled during the mid of semester. The coursework takes a variety of formats, including essays and short questions and is designed to allow the students to evaluate their progress in the module in relation to the specified learning outcomes. This is achieved through feedback on the students. coursework and discussion of the coursework in subsequent lecture/tutorial classes. The examination paper typically has a choice of five questions from a possible six, covering all the learning outcomes.

12.Learning and Teaching Resources

Required textbooks (curricular books, if any	Mechanics of Materials, Hearn,2nd edition, Perjan press,1985
Main references (sources)	
Recommended books and references (scientific journals, reports...)	1. Strength of Materials, R. S. Khurmi, 1st editi 1968. 2. Schaum's Outline of Strength of Materials, Na W. and Potter, M., 2011.
Electronic References, Websites	

Course Description Form

1. Course Name: Histology

2. Course Code: MDER 314

3. Semester / Year: 1st semester \ 3rd year.

4. Description Preparation Date: 20 \ 5 \ 2025

5. Available Attendance Forms: Attendance only.

6. Number of Credit Hours (Total) / Number of Units (Total): 60 hours\3units .

7. Course administrator's name (mention all, if more than one name)

Name: Dr. Eman Ghadhban Khalil
Email: eman.g.khalil@nahrainuniv.edu.iq

8. Course Objectives

Course Objectives	The student will be able : GO-1\ To how diagnose the normal body tissues by light microscope. GO-2 \ To learn , understand& diagnose the normal microscopic and macroscopic structure of body's tissues, organs & systems. GO-3\ To learn & understand the function of tissues, organs & systems. GO-4\To study the components or parts that make up the body systems and the functional and histological relationship that connects them. GO-5\To know the devices& techniques that help in diagnosing and examining tissues, and others that work to obtain the histological or cytological specimens.

9. Teaching and Learning Strategies

Strategy	Theoretical lectures ,LAB sessions pdf, illustrations , educational videos , discussions for: A. Cognitive goals A1. Knowledge and understanding how to diagnose the normal tissue by l microscope. A2. Knowledge & understanding the parts (organs) of body systems. A3. Knowledge & understanding the function of each part ,organ & system. A4. Learn about medical devices needed for diagnosing tissues &organs. A5. To understand the Philosophy of histological constructional structure of tissu organs. B. The skills goals special to the program . B1. Getting an Intellectual skills about how to select the specific device or techniques to reach precise and accurate tissue diagnosis . B2. Getting professional and practical skills about thinking to design simple medical equipment helps in diagnosing various diseases histologically . B3. Learn thinking about advanced techniques & devices (for diagnosis or treatment) or how modify them depending on the need. B4. Detect the changes (damages due to the diseases for example) within the histologically normal tissue. B5.Analyzing, discussing, and using information in the design and evaluation process of medical devices.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method

1	4	The student will be able : .A1. Knowledge and understanding how to diagnose the normal tissue by light microscope. A2. **Knowledge & understanding the parts (organs) of body systems.** A3. **Knowledge & understanding the function of each tissue ,organ & system.** A4. **Learn about medical devices needed to diagnose tissues &organs** A5.To develop the professional medical engineering capabilities of students in the field of diagnostic devices & technologies. A6.**To understand the Philosophy of histological constructional structure of tissues& organs**	Introduction to cell biology , Types of tissues; Epithelial tissue ,characteristic features epithelial cells,	Theoretical lectures& LAB sessions to examine various body tissue segments, educational PDF, videos, illustrations, and discussions	A- Discussions
2	4	=	.Specializations of apical cell surface ,types of epithelia, glandular epithelia , Cell junction Connective tissue; Cells of connective tissue,&connective tissue matrix.	=	A- Quick exam (Quiz) B- Discussions
3	4	=	Types of connective tissue, Cartilage& Bone .	=	A- Quick exam (Quiz) B-Discussions
4	4	=	Muscular tissue; Skeletal muscle ,cardiac muscle, smooth muscle	=	=

5	4		Circulatory System : blood &lymphatic vessels,structural components ,structural plan of the vascular wall. Types of arteries;elastic& muscular arteries,arterioles, capillaries types ,types of veins :post capillary venules,muscular veins,large veins ,. lymph vessels.	=	=
6	4	=	The Heart compartments .layers of heart wall:endocardium ,myocardium epicardium.Cardiac valves.Impulse conducting system.	=	=
7	4	=	Nervous tissue	=	=
8	4	=	Respiratory System components in relation to lungs or function.Respiratory Epithelium.Respiratory portion&conduction portion.	=	=
9	4	=	Mid exam Nasal cavities. olfactory epithelium, Nasopharynx .larynx. Trachea , bronchi ,Bronchioles: Terminal bronchioles.	Mid Exam + Theoretical lecture	Written Mid exam
10	4	=	LAB exam , Respiratory bronchioles. Alveolar duct .Alveolar sac& alveoli .O2 exchange . Pleural membranes Urinary System: renal functions, kidney, nephrons: types .blood supply the kidney.	written practical exa + Theoretical lecture	-written practical exam -Discussions

11	4	=	Renal corpuscles, mesangium. proximal&distal convoluted tubules. Juxtaglomerular apparatu,collecting ducts.The excretory passage. Transitional epithelium.The Ureters,Urinary bladder & Urethera.	Theoretical lectures& LAB sessions to examine various body tissue segments, educational PDF, videos, illustrations, and discussions	A- Quick exam (Quiz) B-Discussions& seminars
12	4	=	The Digestive System: oral cavity ,lips ,tongue ,test buds, pharynx ,general structure of the digestive tract .Esophagus. Stomach.Small Intestine...	=	=
13	4	=	Large Intestine (colon).Rectum .Pancreas&Liver. Biliary tract &Gall bladder The Skin	=	A- Quick exam (Quiz) B-Discussions
14	4	=	Final lab. exam		
15			Final exam		

11. Course Evaluation

The overall grade for the subject is 100%, divided as follows:

40% (rate of 25 % for midterm exam + 10% LAB exam + 3% daily tests + 2% attendance)
+
60% (50% final comprehensive written theoretical exam for the entire subject+10%final LAB exam)

12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Junqueira's Basic Histology - Text and Atlas (13th Ed)
Main references (sources)	principles of anatomy and physiology 12th ed - g. tortora, b
Recommended books and references (scientific journals, reports…)	scientific journals related to b diseases.
Electronic References, Websites	

Course Description Form

1. Course Name:	
Therapeutic Instrumentation	
2. Course Code:	
MDER 424	
3. Semester / Year:	
2nd / 4th Year	
4. Description Preparation Date:	
25.5.2025	
5. Available Attendance Forms:	
Attendance, only	
6. Number of Credit Hours (Total) / Number of Units (Total)	
4 hours / week, total =60 hr	
7. Course administrator's name (mention all, if more than one name)	
Name: Lect. Dr. Samar Ali Jaber Email: samar.a.jaber@nahrainuniv.edu.iq	
8. Course Objectives	
Course Objectives	Lectures and lab session were conducted to teach the students to learn about therapeutic medical devices in the following aspects: 1. Physiological basis of the human interface with the therapeutic device 2. Clinical applications 3. Safety and regulatory environment for those device installation 4. Maintenance and troubleshooting and possible faults 1. CLO-1: Understanding the principles and fundamentals of therapeutic instrumentation and acquiring knowledge of different types of therapeutic instruments and their applications. 2. CLO-2: Gaining proficiency in the use of therapeutic instruments for the treatment and management of various medical conditions. 3. CLO-3: Developing skills in the calibration, maintenance, and troubleshooting of therapeutic instruments while demonstrating competence in ensuring the accuracy and reliability of medical measurements and data. 4. CLO-4: Familiarity with safety protocols and regulations related to therapeutic instrumentation by applying critical thinking and problem-solving skills to identify and address issues with medical instruments. Developing an understanding of the ethical considerations and legal implications associated with medical instrumentation. 5. CLO-5: Enhancing communication and teamwork skills necessary for effective collaboration with healthcare professionals as well as keeping up to date with advancements in medical technology and staying updated on the latest advancements in therapeutic instrumentation and incorporating new technologies into practice.
9. Teaching and Learning Strategies	
Strategy	Assessment is based on hand-in assignments, written exam, Case study, Quizzes, seminars, Practical testing and Online testing.
10. Course Structure	

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
Week 1	2+2	Course Description and Introduction to therapeutic medical instrumentations	Introduction to therapeutic medical instrumentations	Lect+Lab	CW+HW+Quiz
Week 2	2+2	Introduction to safety precautions associated with therapeutic devices, general therapeutic medical device design requirements and application	Safety precautions associated with therapeutic devices.	Lect+Lab	CW+HW+Quiz
Week 3	2+2	Defibrillator device: medical background and working principle	Defibrillator device	Lect+Lab	CW+HW+Quiz
Week 4	2+2	Defibrillator device: Design, maintenance, and troubleshooting	Defibrillator device	Lect+Lab	Seminar+Quiz
Week 5	2+2	Mechanical ventilator machine: medical background and working principle	Mechanical ventilator machine	Lect+Lab	CW+HW+Quiz
Week 6	2+2	Mechanical ventilator machine: Design, maintenance, and troubleshooting	Mechanical ventilator machine	Lect+Lab	CW+HW+Quiz
Week 7	2+2	Anesthesia machine: working principle, design, maintenance, and troubleshooting	Anesthesia machine	Lect+Lab	CW+HW+Quiz
Week 8	2+2	Electrosurgical Machine: medical background and working principle	Electrosurgical Machine	Lect+Lab	CW+HW+Quiz
Week 9	2+2	Electrosurgical machine: Design, maintenance, and troubleshooting	Electrosurgical machine	Lect+Lab	CW+HW+Quiz
Week 10	2+2	Lithotripsy Machine: medical background and working principle	Lithotripsy Machine	Lect+Lab	CW+HW+Quiz
Week 11	2+2	Lithotripsy machine: Design, maintenance, and troubleshooting	Lithotripsy machine	Lect+Lab	CW+HW+Quiz
Week 12	2+2	Assessment	Midterm	Lect+Lab	CW+HW+Quiz
Week 13	2+2	Dental chair: medical background and working principle	Dental chair	Lect+Lab	CW+HW+Quiz
Week 14	2+2	Dental chair: Design, maintenance, and troubleshooting	Dental chair	Lect+Lab	CW+HW+Quiz
Week 15	2+2	Review for the working principle and maintenance procedure for the therapeutic medical instruments	Review	Lect+Lab	Seminar+Quiz
11.Course Evaluation					

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc	
12.Learning and Teaching Resources	
Required textbooks (curricular boo if any)	Introduction to Biomedical Engineering- Third Edition, John Ederel, Joseph Bronzino, 2012.
Main references (sources)	
Recommended books and references (scientific journals, reports...)	Medical Instrumentation Application and Design- Fourth Edition, John G Webster, 2000. Biomedical Instrumentation Technology and Application- Second Edition, R.S. Kaandpur, 2003
Electronic References, Websites	Youtube: related to medical instrumentation advances. Medical devices companies website: to be up to date with the technical advancements in medical technologies

Course Description Form

1. Course Name:	
Introduction to BME	
2. Course Code:	
MDER 226	
3. Semester / Year:	
2nd / 2nd Year	
4. Description Preparation Date:	
25.5.2025	
5. Available Attendance Forms:	
Attendance, only	
6. Number of Credit Hours (Total) / Number of Units (Total)	
2 hours / week, total =30 hr	
7. Course administrator's name (mention all, if more than one name)	
Name: Lect. Dr. Samar Ali Jaber Email: samar.a.jaber@nahrainuniv.edu.iq	
8. Course Objectives	
Course Objectives	The lectures were conducted to address all the different roles that the biomedical engineer can have in the life cycle of the technology, from research and development, and innovation, mainly undertaken in academia; the regulation of devices entering the market; the assessment or evaluation in selecting and prioritizing medical devices (usually at national level); to the role they play in the management of devices from selection and procurement, to safe use in health-care facilities. In addition, the students will be subjected with current issues in the healthcare system to be analyzed and offer suggested solutions according to advanced international healthcare systems. 1. CLO-1: Understanding the interdisciplinary nature of biomedical engineering: Students gain an appreciation for the integration of principles from various fields, such as biology, medicine, engineering, and physics, in biomedical engineering. 2. CLO-2: Regulatory Compliance and Ethical Considerations: Graduates should be aware of the regulatory frameworks and standards governing the development and use of medical devices and technologies. They should also have a strong understanding of ethical considerations, including patient privacy, informed consent, and the responsible use of biomedical technologies. 3. CLO-3: Research skills: Students may develop research skills through exposure to ongoing research in the field and by engaging in independent or collaborative research projects. This includes literature review, experimental design, data analysis, and interpretation. 4. CLO-4: Awareness of industry and career opportunities: Students gain insights into the diverse career paths available in the field of biomedical engineering, including academic research, industry, healthcare institutions, regulatory agencies, and entrepreneurship. 5. CLO-5: Familiarity with healthcare technologies: Students develop an understanding of the design, development, and application of medical devices, diagnostic tools, prosthetics, and therapeutic systems used in healthcare settings.
9. Teaching and Learning Strategies	

Strategy	Assessment is based on hand-in assignments, written exam, Case study, Quizzes, seminars, Practical testing and Online testing.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
Week 1	2	Course Description and Introduction	Introduction	Lecture	CW+HW+Quiz
Week 2	2	Understanding the Education for biomedical engineers	Education and Training	Lecture	CW+HW+Quiz
Week 3	2	Understanding the Training for biomedical engineers	Education and Training	Lecture	CW+HW+Quiz
Week 4	2	Professional Associations and their roles supporting the professionals in the field	Professional Associations	Lecture	CW+HW+Quiz
Week 5	2	Roles of BME in Regulation of Medical Devices	Regulation of Medical Devices	Lecture	CW+HW+Quiz
Week 6	2	Roles of BME in Regulation of Medical Devices	Regulation of Medical Devices	Lecture	Report
Week 7	2	Roles of BME in Management of Medical Devices	Management of Medical Devices	Lecture	CW+HW+Quiz
Week 8	2	Roles of BME in Management of Medical Devices	Management of Medical Devices	Lecture	CW+HW+Quiz
Week 9	2	Assessment	Midterm Exam	Lecture	
Week 10	2	Roles of BME in Evolution of Medical Devices	Evolution of Medical Devices	Lecture	CW+HW+Quiz
Week 11	2	Roles of BME in Evolution of Medical Devices	Evolution of Medical Devices	Lecture	CW+HW+Quiz
Week 12	2	Roles of BME in Managements of Medical Devices	Managements of Medical Devices	Lecture	CW+HW+Quiz
Week 13	2	Roles of BME in Managements of Medical Devices	Roles of BME in Managements of Medical Devices	Lecture	CW+HW+Quiz
Week 14	2	Roles of BME in Disaster Management	Disaster Management	Lecture	Report
Week 15	2	Review of the roles of biomedical engineers and the career path possibilities after graduation	Review of the roles of biomedical engineers and the career path possibilities after graduation	Lecture	CW+HW+Quiz

11.Course Evaluation

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

12.Learning and Teaching Resources

Required textbooks (curricular books, if any)	Introduction to Biomedical Engineering- Third Edition, John Ederel, Joseph Bronzino, 2012.
Main references (sources)	
Recommended books and references (scientific journals, reports...)	Medical Instrumentation Application and Design- Fourth Edition, John G Webster, 2000.
Electronic References, Websites	WHO guideline and updated Boimedical Engineering professional regulations. CDC and FDA updated Boimedical Engineering guidelines and regulations.

Course Description Form

1. Course Name:	
Medical Instrumentation	
2. Course Code:	
MDER 413	
3. Semester / Year:	
1st / 4th Year	
4. Description Preparation Date:	
25.5.2025	
5. Available Attendance Forms:	
Attendance, only	
6. Number of Credit Hours (Total) / Number of Units (Total)	
4 hours / week, total =60 hr	
7. Course administrator's name (mention all, if more than one name)	
Name: Lect. Dr. Samar Ali Jaber Email: samar.a.jaber@nahrainuniv.edu.iq	
8. Course Objectives	
Course Objectives	Lectures and lab session were conducted to teach the students to learn about medical devices in the following aspects: • Technical, design, development aspects • Physiological basis of the human interface with the measurement medical device • Clinical applications • Safety and regulatory environment for those device installation • Maintenance and troubleshooting and possible faults 1.CLO-1: Understanding the principles and fundamentals of medical instrumentation and acquiring knowledge of different types of medical instruments and their applications. 2.CLO-2: Gaining proficiency in the use of medical instruments for measurement of bio signals, monitoring, and analysis of various medical conditions. 3.CLO-3: Developing skills in the calibration, maintenance, and troubleshooting of medical instruments while demonstrating competence in ensuring the accuracy and reliability of medical measurements and data. 4.CLO-4: Familiarity with safety protocols and regulations related to medical instrumentation by applying critical thinking and problem-solving skills to identify and address issues with medical instruments. Developing an understanding of the ethical considerations and legal implications associated with medical instrumentation. 5.CLO-5: Enhancing communication and teamwork skills necessary for effective collaboration with healthcare professionals as well as keeping up to date with advancements in medical technology and staying informed about new developments in the field of medical instrumentation.
9. Teaching and Learning Strategies	

Strategy	Assessment is based on hand-in assignments, written exam, Case study, Quizzes, seminars, Practical testing and Online testing.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
Week 1	2+2	Course Description and Introduction to medical instrumentations	Introduction to medical instrumentations	Lect+Lab	CW+HW+Quiz
Week 2	2+2	Introduction to bio-signals, transducers, and general medical device block diagram	Bio-signals	Lect+Lab	CW+HW+Quiz
Week 3	2+2	Electromyogram device: medical background and working principle	Electromyogram device	Lect+Lab	CW+HW+Quiz
Week 4	2+2	Electromyogram device: Design, maintenance, and troubleshooting	Electromyogram device	Lect+Lab	Seminar+Quiz
Week 5	2+2	Electrocardiogram device: medical background and working principle	Electrocardiogram device	Lect+Lab	CW+HW+Quiz
Week 6	2+2	Electrocardiogram device: Design, maintenance, and troubleshooting	Electrocardiogram device	Lect+Lab	CW+HW+Quiz
Week 7	2+2	Electroencephalogram device: medical background and working principle	Electroencephalogram device	Lect+Lab	CW+HW+Quiz
Week 8	2+2	Electroencephalogram device: Design, maintenance, and troubleshooting	Electroencephalogram device	Lect+Lab	CW+HW+Quiz
Week 9	2+2	Assessment	Midterm Exam	Lect+Lab	
Week 10	2+2	Laboratory equipment: Spectrophotometer, colorimeter, and flame-photometer: working principle, design, maintenance, and troubleshooting	Laboratory equipment:	Lect+Lab	CW+HW+Quiz
Week 11	2+2	Laboratory equipment: Spectrophotometer, colorimeter, and flame-photometer: working principle, design, maintenance, and troubleshooting	Laboratory equipment:	Lect+Lab	CW+HW+Quiz
Week 12	2+2	Laboratory equipment: Blood counter Centrifuge working principle, design, maintenance, and troubleshooting	Laboratory equipment:	Lect+Lab	CW+HW+Quiz
Week 13	2+2	Spirometer: working principle, design,	Spirometer	Lect+Lab	CW+HW+Quiz

		maintenance, and troubleshooting			
Week 14	2+2	Oximeter: working principle, design, maintenance, and troubleshooting	Oximeter	Lect+Lab	CW+HW+Quiz
Week 15	2+2	Review for the working principle and maintenance procedure for the measurement medical instruments	Review	Lect+Lab	Seminar+Quiz

11.Course Evaluation

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

12.Learning and Teaching Resources

Required textbooks (curricular books any)	Introduction to Biomedical Engineering- Third Edition, John Ederel, Joseph Bronzino, 2012.
Main references (sources)	
Recommended books and references (scientific journals, reports...)	Medical Instrumentation Application and Design- Fourth Edition, John G Webster, 2000. Biomedical Instrumentation Technology and Application- Second Edition, R.S. Kaandpur, 2003
Electronic References, Websites	Youtube: related to medical instrumentation advances. Medical devices companies website: to be up to date with the technical advancements in medical technologies

Course Description Form

Biomaterials 1 / MDER411

1. Course Name:
Biomaterials I
2. Course Code:
MDER411
3. Semester / Year:
1st semester \ 4th year \ 2024-2025
4. Description Preparation Date:
12/9/2024
5. Available Attendance Forms:
Attendance only
6. Number of Credit Hours (Total) / Number of Units (Total)
2 hours / weak, total = 30 hr / Number of Units: 2
7. Course administrator's name (mention all, if more than one name)
Name: Dr Alaa Ayyed Jebur Al-Taie Email: alaa.ayyed@nahrainuniv.edu.iq
8. Course Objectives

Course Objectives	This field is dynamic and interdisciplinary, involving concepts from materials science, biology, engineering, and medicine to advance our understanding and application of biomaterials in various domains. 1. Understanding material properties: One of the primary aims of materials science is to gain a deep understanding of the physical, chemical, mechanical, electrical, and thermal properties of materials. This knowledge helps in developing new materials with improved performance or discovering new applications for existing materials. 2. Materials design and development: Materials scientists aim to design and develop new materials with specific properties to meet the requirements of various industries. This involves exploring different material compositions, structures, and processing techniques to achieve desired characteristics such as strength, durability, conductivity, or magnetism. 3. Enhancing material performance: Materials scientists work to enhance the performance of existing materials by optimizing their structure, composition, and processing methods. This includes improving properties such as strength, toughness, corrosion resistance, and thermal stability, among others. 4. Sustainability and environmental considerations: With growing concerns about environmental impact, materials science aims to develop sustainable and eco-friendly materials and processes. Researchers focus on developing materials with reduced energy consumption, recyclability, and biodegradability, as well as exploring alternative sources of raw materials.

	5. Advancing manufacturing techniques: Materials science plays a crucial role in developing advanced manufacturing techniques and processes. Researchers aim to improve manufacturing methods like casting, molding, additive manufacturing (3D printing), and nanofabrication to produce materials with enhanced properties and complex structures. 6. Advancing Materials Science and Engineering: Biomaterials field aims to contribute to the advancement of materials science and engineering. By studying the interactions between materials and biological systems, researchers can gain insights into fundamental material properties, surface modifications, degradation mechanisms, and fabrication techniques. The aim is to develop new biomaterials, fabrication methods, and characterization techniques that can have broader applications beyond the field of biomaterials. 7. Understanding of Material-Biological Interactions: the fundamental principles of how materials interact with biological systems, including cells, tissues, and organs. This includes studying the biocompatibility of materials, understanding how materials influence cellular behavior, and evaluating the response of the immune system to biomaterial implants. 8. Tissue Engineering and Regenerative Medicine: Biomaterials play a critical role in tissue engineering and regenerative medicine. Students learn about the principles and strategies involved in creating scaffolds, matrices, and delivery systems for tissue regeneration. They also explore the integration of biomaterials with stem cells, growth factors, and other bioactive agents to promote tissue repair and regeneration

9. Teaching and Learning Strategies

Strategy	– Active Learning and Brainstorming – Real-World Applications – Collaborative Learning

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Knowledge of materials	Introduction to biomaterials	Lecture	1.Exams 2. Quiz 3. Reports
2-3	4	Knowledge of materials	Types of biomaterials	Lecture	
4	2	Material processing and synthesis, Material	Biomaterials properties	Lecture	

		properties and behavior			
5	2	Material properties and behavior	Mechanical properties	Lecture	
6-7	4	Material selection and design	Bioceramics	Lecture	
8	2	Materials in different applications	Bioactive glasses	Lecture	
9	2	Materials in different applications	hydroxyapatite	Lecture	
10-11	4	Materials in different applications, Material selection and design	Polymers as biomaterials	Lecture	
12	2	Materials in different applications, Material selection and design, Understanding material performance and failure	Natural polymers	Lecture	
13	2	Materials in different applications, Material selection and design	Denture base resin	Lecture	
14	2	Materials in different applications, Material selection and design, Understanding material performance and failure	Materials in maxillofacial prosthetics	Lecture	
15	3	Final Exam			

11. Course Evaluation

Midterm exams: 25
Quizzes: 10
Report: 5
Final Exam: 60

12. Learning and Teaching Resources

	Materials Science and Engineering an Introduction
	Biomaterials Science An introduction to materials in medicine by Buddy D. Ratner, Allan S. Hoffman, Frederick J. Schoen, Jack E. Lemons (z-lib.org)

Course Description Form

Biomaterials II / MDER415

1. Course Name:
Biomaterials II
2. Course Code:
MDER415
3. Semester / Year:
2nd Semester \ 4th year\ 2024-2025
4. Description Preparation Date:
28/1/2025
5. Available Attendance Forms:
Attendance only
6. Number of Credit Hours (Total) / Number of Units (Total)
2 hours / weak, total = 30 hr / Number of Units: 2
7. Course administrator's name (mention all, if more than one name)
Name: Dr Alaa Ayyed Jebur Al-Taie Email: alaa.ayyed@nahrainuniv.edu.iq
8. Course Objectives

Course Objectives	1. Overall, the aims of biomaterials revolve around improving the interaction between materials and biological systems, facilitating tissue regeneration and repair, and advancing medical treatments and technologies. 2. Enhance Tissue Regeneration: Biomaterials are designed to promote the regeneration and repair of damaged or diseased tissues. The aim is to create scaffolds, matrices, and delivery systems that can support cell growth, migration, and differentiation, leading to functional tissue formation. 3. Improve Biocompatibility: Biomaterials aim to enhance their compatibility with living systems. This involves developing materials that can interact with biological tissues and organs without causing adverse reactions or immune responses. 4. Enable Medical Device Development: Biomaterials play a crucial role in the development of medical devices, such as implants and prosthetics. The aim is to create materials that possess the necessary mechanical properties, biocompatibility, and durability to improve the performance and lifespan of medical devices. 5. Address Biocompatibility Challenges: Biomaterials research aims to address challenges related to biocompatibility, such as immune responses, inflammation, and infection. The aim is to develop

	innovative strategies and surface modifications to improve the integration and long-term performance of biomaterials in the body.

9. Teaching and Learning Strategies

Strategy	– Active Learning and Brainstorming – Real-World Applications – Collaborative Learning

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	EXPLAINING the interaction between materials and biological systems, facilitating tissue regeneration and repair, and advancing medical treatments and technologies	Metals and Alloys .	Lecture	1.Exams 2. Quiz 3. Reports
2-3	4	Enable Medical Device Development	mechanical behavior of metals.	Lecture	
4	2	Enable Medical Device Development Address Biocompatibility Challenges	Medical applications of metals Alloy I	Lecture	
5	2	Enable Medical Device Development Address Biocompatibility Challenges	Medical applications of metals Alloy II	Lecture	
6-7	4	EXPLAINING the interaction between materials and biological systems, facilitating tissue regeneration and repair, and advancing medical	Surface structure Metals and Alloys	Lecture	

		treatments and technologies			
8	2	Enhance Tissue Regeneration	Biological Properties of Metals and Alloys	Lecture	
9	2	Address Biocompatibility Challenges	Corrosion and wear inside the human body	Lecture	
10-11	4	Enable Medical Device Development Enhance Tissue Regeneration Improve Biocompatibility	Introduction to hard tissue replacement including the description of the used medical tools	Lecture	
12	2	Enable Medical Device Development Enhance Tissue Regeneration Improve Biocompatibility	Total Joint Replacement	Lecture	
13	2	advancing medical treatments and technologies	COMPOSITES	Lecture	
14	2	Address Biocompatibility Challenges	BIOCOMPATIBILITY TESTING	Lecture	
15	3	Final Exam			

11. Course Evaluation

Midterm exams: 25
Quizzes: 10
Report: 5
Final Exam: 60

12. Learning and Teaching Resources

	Materials Science and Engineering an Introduction
	Biomaterials Science An introduction to materials in medicine by Buddy D. Ratner, Allan S. Hoffman, Frederick J. Schoen, Jack E. Lemons (z-lib.org)

Course Description Form

1. Course Name:	
Biomechanics I	
2. Course Code:	
MDER410	
3. Semester / Year:	
1st semester / 4th year	
4. Description Preparation Date:	
1.9.2024	
5. Available Attendance Forms:	
Attendance, only	
6. Number of Credit Hours (Total) / Number of Units (Total)	
5 hours / week, total = 75 hours	
7. Course administrator's name (mention all, if more than one name)	
Name: Dr. Sadiq J. Hamandi, Hamza Abbas Fadhel Email: sadiq.j.abbas@nahrainuniv.edu.iq, hamza.abbas@nahrainuniv.edu.iq	
8. Course Objectives	
Course Objectives	• Describe the scope of scientific inquiry addressed by biomechanists • An understanding the core concepts of mechanics such as mass, force, velocity, acceleration, work, energy, and power and describe the different types of mechanical loads that act on the human body. • Describe the processes involved in the biomechanics of human bone growth and development, human skeletal articulations, and human skeletal muscle • The skills needed to apply the fundamental laws of mechanics such as Newton's laws and conservation of energy to perform quantitative analysis of human body motion and equilibrium. • The ability to practically apply the underpinning theoretical concepts to design experiments and analyze experimental data related to physical activity

9. Teaching and Learning Strategies	
Strategy	Assessment is based on hand-in assignments, written exam, Case study, Quizzes, seminars, Practical testing and Online testing.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	5	Describe Biomechanics	What Is Biomechanics?	Lectures	-
2	5	Identify the types of Human Motion	Kinematic Concepts for Analyzing Human Motion	Lectures Solving Problems Lab	Quiz
3	5	Categorize types of Human Motion	Kinetic Concepts for Analyzing Human Motion	Solving Problems Lab	-
4	5	Categorize theory of Bone Growth	The Biomechanics of Human Bone Growth and Development	Lectures Lab	-
5	5	Describe the characteristics of Skeletal Articulations	The Biomechanics of Human Skeletal Articulations	Solving Problems Lab	Quiz
6	5	Plan ways to Skeletal Muscle	The Biomechanics of Human Skeletal Muscle	Lectures Lab	-
7	5	Select Human Skeletal Muscle	The Biomechanics of Human Skeletal Muscle	Solving Problems Lab	-
8	5		Midterm Exam 1	-	Mid Exams
9	5	Describe Human Upper Extremity	The Biomechanics of the Human Upper Extremity	Lectures Lab	-
10	5	Categorize types of Human Upper Extremity	The Biomechanics of the Human Upper Extremity	Solving Problems Lab	-
11	5	Identify Human Lower Extremity	The Biomechanics of the Human Lower Extremity	Lectures Lab	Quiz

12	5	Develop Human Lower Extremity	The Biomechanics of the Human Lower Extremity	Solving Problems Lab	-
13	5	Link different type of Human Spine	The Biomechanics of the Human Spine	Lectures Lab	Quiz
14	5	Classify Human Spine	The Biomechanics of the Human Spine	Solving Problems Lab	-
15	5		Midterm Exam 2		Mid Exams

11. Course Evaluation

Mid Exam 1: 10%
Mid Exam 2: 10%
Seminar: 5%
Lab: 15%
Final Exam: 60%

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Basic biomechanics, Susan Jean Hall
Main references (sources)	Fundamental Concepts of Biomechanics
Recommended books and references (scientific journals, reports...)	Basic Biomechanics of the Musculoskeletal System
Electronic References, Websites	https://www.physio-pedia.com/Biomechanics

Course Description Form

1. Course Name:	
Biomechanics II	
2. Course Code:	
MDER420	
3. Semester / Year:	
2nd semester / 4th year	
4. Description Preparation Date:	
1.9.2024	
5. Available Attendance Forms:	
Attendance, only	
6. Number of Credit Hours (Total) / Number of Units (Total)	
5 hours / week, total = 75 hours	
7. Course administrator's name (mention all, if more than one name)	
Name: Dr. Sadiq J. Hamandi, Hamza Abbas Fadhel Email: sadiq.j.abbas@nahrainuniv.edu.iq, hamza.abbas@nahrainuniv.edu.iq	
8. Course Objectives	
Course Objective	• Discuss the interrelationships among kinematic variables and angular kinematic variables • Explain the relationships among angular and linear displacement, angular and linear velocity, and angular and linear acceleration. • Describe the processes involved in the biomechanics of human bone growth and development, human skeletal articulations, and human skeletal muscle • Identify Newton's laws of motion and gravitation and describe practical illustrations of the laws. • Discuss the human movement in a fluid medium.
9. Teaching and Learning Strategies	
Strategy	Assessment is based on hand-in assignments, written exam, Case study, Quizzes, seminars, Practical testing and Online testing.

10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	5	Describe Linear kinematics	Linear kinematics of human movement	Lectures	-
2	5	Identify the types of Human Motion	Linear kinetics of human movement	Lectures Solving Problems Lab	Quiz
3	5	Categorize types of Human Motion	Angular kinematics of human movement	Solving Problems Lab	-
4	5	Categorize Angular kinematics	Angular kinematics of human movement	Lectures Lab	-
5	5	Describe Equilibrium	Equilibrium and human movement	Solving Problems Lab	Quiz
6	5	Plan ways to human movement	Equilibrium and human movement	Lectures Lab	-
7	5		Midterm Exam 1	Solving Problems Lab	-
8	5	Select Human kinetics	Angular kinetics of human movement	-	Mid Exams
9	5	Describe kinetics of human movement	Angular kinetics of human movement	Lectures Lab	-
10	5	Categorize types of a fluid medium	Human movement in a fluid medium	Solving Problems Lab	-
11	5	Identify movement in a fluid medium	Human movement in a fluid medium	Lectures Lab	Quiz
12	5	Develop Human Lower Extremity	The Biomechanics of the Human Lower Extremity	Solving Problems Lab	-
13	5	Link different type of Occupational biomechanical models	Occupational biomechanical models	Lectures Lab	Quiz
14	5	Classify Nonparallel	Static Planar Model of	Solving Problems Lab	-

		Forces	Nonparallel Forces		
15	5		Midterm Exam 2		Mid Exams

11. Course Evaluation

Mid Exam 1: 10%
Mid Exam 2: 10%
Seminar: 5%
Lab: 15%
Final Exam: 60%

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Basic biomechanics, Susan Jean Hall
Main references (sources)	Biomechanical Basis of Human Movement
Recommended books and references (scientific journals, reports...)	Biomechanics and Gait Analysis
Electronic References, Websites	http://graphics.cs.cmu.edu/projects/muscle/

Course Description Form

1. Course Name:	
Digital Electronics II	
2. Course Code:	
MDER424	
3. Semester / Year:	
2nd Semester / 4th Class / 2024-2025	
4. Description Preparation Date:	
01/09/2024	
5. Available Attendance Forms:	
Attendance only	
6. Number of Credit Hours (Total) / Number of Units (Total)	
90 hours total, 6 hours per week / 3 Units: 2-hour lecture. 1-hour tutorial. 3-hour laboratory	
7. Course administrator's name (mention all, if more than one name)	
Name: Asst. Lect. Ahmed Lateef Khudaraham Email: ahmed.lateef771@nahrainuniv.edu.iq	
8. Course Objectives	
Course Objectives	• **Understand the Fundamentals of Sequential Logic** To introduce the principles of sequential circuits, including the role of memory elements like flip-flops and latches. • **Analyze and Design Basic Sequential Circuits** To enable students to analyze, design, and troubleshoot circuits such as counters, shift registers, and finite state machines (FSMs). • **Study Various Types of Flip-Flops and Their Applications** To examine different types of flip-flops (SR, JK, D, T) and their use in timing, control, and data storage applications. • **Design and Analyze Synchronous and Asynchronous Circuits** To differentiate and implement both synchronous and asynchronous sequential circuits based on timing and control requirements. • **Develop State Diagrams and State Tables** To teach students how to represent and reduce the behavior of sequential systems using state diagrams and state transition tables.

	• **Use Timing Analysis and Clocking Techniques** To understand timing constraints, setup/hold times, and the role of clocking in sequential circuit performance. • **Simulate and Implement Sequential Circuits** To use digital design tools and hardware (e.g., breadboard) for simulating and testing sequential logic systems.

9. Teaching and Learning Strategies

Strategy	• Active Learning Techniques. • Collaborative Learning. • Brainstorming teaching strategies.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Introduction to Sequential Circuits			
2	2	Sequential Logic Circuits: Latches		-Lectures	
3	2	Flip-Flops: Design and Applications		- Experiments	-Quizzes,
4	2	SR, D, T, and JK Flip-Flops			-Mid-Terms
5	2	Circuit and State Diagram and Timing Waveforms			-Lab
6	2	Characteristics, Excitation Tables, and Conversion Techniques of Flip-Flops			
7	2	Midterm Exam			
8	2	Asynchronous Counters			
9	2	Design of Asynchronous Counters : Modules of Counters			
10	2	Timing Diagram and Truth Tables of Ripple Counters			
11	2	Synchronous Counters			
12	2	Design of Synchronous Counters : Modules of Counters			
13	2	Serial in Parallel out Register; Serial in Serial out Register			
14	2	Parallel in Serial out Register, Parallel in Parallel out Register coders			
15	2	The 555 IC			
16	2	Preparatory week before the final Exam			

11. Course Evaluation

Mid-Terms: 20%
Laboratory: 15%
Quizzes: 5%

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Thomas L. Floyd, Digital Fundamentals. 11th edition
Main references (sources)	Thomas L. Floyd, Digital Fundamentals. 11th edition
Recommended books and references (scientific journals, reports...)	M. Morris Mano and Michael D. Ciletti, Digital Design. edition.
Electronic References, Websites	https://www.tutorialspoint.com/digital-electronics/index.htm

Course Description Form

Thermo-Fluid Mechanics 1 / MDER415

1. Course Name:
Thermo-Fluid Mechanics 1
2. Course Code:
MDER415
3. Semester / Year:
1st/ Fourth-year/ 2024-2025
4. Description Preparation Date:
12/9/2025
5. Available Attendance Forms:
Attendance only, Google class
6. Number of Credit Hours (Total) / Number of Units (Total)
3 hours / weak, total = 45 hr / Number of Units: 2
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Basma Abdulsahib Faihan
8. Course Objectives

Course Objectives	The course aims to introduce students to the properties of fluids and the potential energy that they possess, in addition to the basic forces at rest and the forces that lead to their movement and resulting from their movement.
9. Teaching and Learning Strategies	
Strategy	– Active Learning and Brainstorming – Problem-Based Learning – Real-World Applications – Collaborative Learning

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1-2	6	Understanding general concepts of fluid mechanics	Introduction to fluids mechanics	Lecture	Discussion

3	3	Knowing the general properties of fluids	Fluid properties	Lecture	Quiz
4-5	6	Analysis of forces and stresses at rest	Fluid statics	Lecture + Tutorial	Exam
6	3	-	Mid-term exam 1	-	-
7,8	6	Fluid flow analysis	Fluid Kinematics	Lecture + Tutorial	Reports
9	3	How to apply energy equations	Bernoulli and Energy Equations	Lecture	Quiz
10-11	6	System analysis using Conservation laws	Conservation laws	Lecture	Discussion +Quiz
12	3	-	Mid-term exam 2	-	-
13	2	System analysis using conservation of momentum	Conservation of momentum	Lecture + Discussion	Design Exam
14	3	System analysis using conservation of energy	Conservation of Energy	Lecture + Discussion	Quiz
15	3	Final Exam			

11.Course Evaluation

Midterm exams: 20
Quizzes: 10
Report: 5
Assessment: 5
Final Exam: 60

12.Learning and Teaching Resources

Required textbooks (curricular books, if any)	Introduction to Fluid Mechanics ,Edward J. Shaughnessy ,James P. Schaffer ,Oxford UniversityPress,2005
Main references (sources)	Biofluid Mechanics: an introduction to fluid mechanics, microcirculation, and microcirculation, David A. Rubenstein, Wei Yin and Mary D. Frame, second Edition
Recommended books and references (scientific journals, reports...)	https://www.classcentral.com/course/youtube-fluid-mechanics-i-dr-biddle-s-lecture-series-53025/classroom
Electronic References, Websites	Introduction to Fluid Mechanics ,Edward J. Shaughnessy ,James P. Schaffer ,Oxford UniversityPress,2005

Course Description Form

Thermo-Fluid Mechanics II/ MDER426

1. Course Name:
Thermo-Fluid Mechanics II
2. Course Code:
MDER426
3. Semester / Year:
2nd / Fourth-year/ 2024-2025
4. Description Preparation Date:
10 / 1 / 2025
5. Available Attendance Forms:
Attendance, Online (Google class)
6. Number of Credit Hours (Total) / Number of Units (Total)
2 hours / weak, total = 30 hr / Number of Units: 2
7. Course administrator's name (mention all, if more than one name)
L.Dr. Basma Abdulsahib Faihan
8. Course Objectives
The course aims to introduce students to the basic concepts of heat transfer modalities and heat exchanger design. Then, movement of molecules through membranes is studied via Fick's law of diffusion. Psychometric processes and gas mixing is also studied. Finally, the movement of a substance from one compartment to another is studied through compartmental modeling.
9. Teaching and Learning Strategies
• Active Learning and Brainstorming • Problem-Based Learning • Real-World Applications
10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Introduction	Introduction to fluids mechanics	Lecture	Discussion
2-3	4	Understanding energy and the first law of thermodynamics	Using Energy and The First Law of Thermodynamics	Lecture	Quiz
4-5	4	Understanding heat transfer modalities and their applications in biomedical engineering	Heat Transfer Mechanisms	Lecture	Quiz
6	2	- Analysis, justification and comparison. - Accuracy of observation and depth of thinking.	Mid-term exam 1	-	Exam
7-8	4	Understanding how to use charts in the design process	Psychometric processes	Lecture + Tutorial	Assessment
9	2	Understanding the movement of molecules physics and the analogy with heat transfer	Fundamentals of Mass Transfer	Lecture	Quiz
10-12	4	Understanding the movement of molecules physics and the analogy with heat transfer	Diffusion	Lecture	Quiz
13	2	Analysis, justification and comparison. - Accuracy of observation and depth of thinking. - The accuracy of decision-making	Mid-term exam 2	-	Exam
14	2	Understanding Real-World Applications	Applications in BME	Lecture + Discussion	Reports

11.Course Evaluation

Midterm exams: 23
Quizzes: 12
Assessment: 5
Final Exam: 60

12.Learning and Teaching Resources

Required textbooks (curricular books, if any)	1. Fundamentals of Momentum, Heat, and Mass Transfer, James R. Welty, Charles E. Wicks, Robert E. Wilson, and Gregory L. Rorrer , 5th Edition
Main references (sources)	2. Heat and mass transfer, fundamentals & applications Cengel, Afshin J. Ghajar, 6th Edition
Recommended books and references (scientific journals, reports...)	- Biofluid Mechanics: an introduction to fluid mechanics, macrocirculation, and microcirculation, David A. Rubenstein, Wei Yin and Mary D. Frame, 2nd Edition

Course Description Form

1. Course Name: **PATHOLOGY**

2. Course Code: MDER 416

3. Semester / Year: 1st semester \ 4th year.

4. Description Preparation Date: 20\5\2025

5. Available Attendance Forms: Attendance only.

6. Number of Credit Hours (Total) / Number of Units (Total): 30 hours\2units .

7. Course administrator's name (mention all, if more than one name)

Name: Dr. Eman Ghadhban Khalil
Email: eman.g.khalil@nahrainuniv.edu.iq

8. Course Objectives

Course Objectives	The student will be able : -1- To knowledge & understand the causes,pathogenesis of cardiovascular system diseases & respiratory system diseases . 2-To knowledge& understand the normal& abnormal function, structure of cardiovascular &respiratory syetem . 3-learnning the outcome of the diseases &how they are managed. 4-To learn principles of diagnostic techniques in pathology . 5-To develop the professional medical engineering capabilities of students in the field of diagnostic devices & technologies.

9. Teaching and Learning Strategies

Strategy	Theoretical lectures , pdf, illustrations , educational videos , discussions to make the student able : **1\To differentiate the normal from abnormal conditions of cardiovascular ,respiratory system .** **2\ how to apply this philosophy in work field(diagnosis) & How to get the skills.** **3\Learn about medical devices needed for the diagnosis &treatment the diseases .**

	4\Getting specific skills through thinking to design simple medical equipment help in the diagnosis or the treatment . **5\Repair the defects in the devices or the equipment or modify it .** **6\Learn thinking about advanced techniques & devices .** **7\Using different on new techniques to help in diagnosing diseases.** **8\.Analyzing, discussing, and using information to design and evaluation medical devices**

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	The student will be able : . Knowledge and understanding 1\To differentiate the normal from abnormal conditions cardiovascular,respiratory system 2\ how to apply this philosophy in work field(diagnosis) & How to get the skills. 3\Learn about medical devices needed for diagnosis &treatment diseases . 4\Getting specific skills through thinking to design simple medical equipment help in diagnosis or the treatment . 5\Repair the defects in devices or the equipment modify it . 6\Learn thinking about advanced techniques & devices . 7\Using different new techniques to help in diagnosing diseases. 8\.Analyzing, discussing, and using information to design and evaluation medical devices	Introduction :cell,tissue ,organs,organ system.development of cell biology	Theoretical lectures , educational PDF, videos, illustrations, and discussions	Discussions

3	2	=	Pathology,Etiology& Pathogenesis.Biopsy types & general rules. In Tissue processing,fixation& types.	=	A- Quick exam (Quiz) B-Discussions
4	2	=	Diagnostic techniques pathology,Cytology& cytological techniques ,smear preparation. ,needle aspiration technique, Cytogenetic& Karyotyping. Frozen sections ,	=	=
5	2		electron microscopy,Flocytometer, munoflorescence, Immunohistochemistry& Polymerase chain reaction	=	=
6	2	=	Cell injury ,Necrosis . Radiation& cell damage . Inflammation ,Acute Inflammation types ,changes&sequels.	=	=
7	2	=	Chronic inflammation. , ulceration , the sinus ,fistula ,cellulitis. Systemic effects of inflammation.	=	=
8	2	=	Repair in chronic inflammation. Wound Healing &Repair. Hemodynamic disorders, Hemostasis,, Thrombosis, Embolism,	=	=
9	2	=	Mid exam		Written Mid exam

10	2	=	Infarction,Edema ,Hyperemia &Congestion. Arterial diseases,Atheroma ,Aneurysms	=	-Discussions
11	2	=	Heart& cardiac function .Heart failure ,Ischaemic heart disease, Acute heart failure &Chronic heart failure. Coronary artery disease,Myocardial infarction	=	A- Quick exam (Quiz) B-Discussions& seminars
12	2	=	Angina Pectoris .Valvular heart Disease. Respiratory system disorders; Inflammation of upper respiratory tract;Acute inflammation,	=	=
13	2	=	Chronic inflammation Acute& Chronic Bronchitis ,Emphysema , Pneumonia, Broncho-pneumonia ,Lobar-pneumonia	=	A- Quick exam (Quiz) B-Discussions
14	2	=	Tuberculosis. Neoplasia,	=	discussion
15			Final exam		

11. Course Evaluation

The overall grade for the subject is 100%, divided as follows:

40% (rate of 30% for midterm exams + 4% daily tests + 3% seminars +3% Attendance)
+
60% final exam(comprehensive written theoretical exam for the entire subject)

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	1-Robbins Pathologic basis of disease. 2-Curran s Atlas of Histopathology .4th

	edition. 3-Davidson s Principles & practice of medicine 22 st edition 4- Pathologic-Basis-Of-Disease-Third-Edition
Main references (sources)	principles of anatomy and physiology 1 ed - g. tortora, b
Recommended books and references (scientific journals, reports…)	scientific journals related to bone diseases.
Electronic References, Websites	Internet :Web Site\related articles & power points .

Course Description Form

1. Course Name:

Control I

2. Course Code:

MDER 512

3. Semester / Year:

2023- 2024/ 5th

4. Description Preparation Date:

12/ 9/ 2024

5. Available Attendance Forms:

in-person only

6. Number of Credit Hours (Total) / Number of Units (Total)

3 Hours / 2 Units/ total= 45 hr

7. Course administrator's name (mention all, if more than one name)

Name: Asst.Prof.Dr. Hdaeel Kassim Aljobouri
Email: hadeel_bme77@yahoo.com

8. Course Objectives

Course Objectives	**This course has been designed to introduce the students to the basic theory of Feedback Control Systems. These early systems incorporated many of the same ideas of feedback that are in use today. After studying this, course students should be able to derive mathematical methods of physical systems and check the stability of control systems in the time domain.**

9. Teaching and Learning Strategies

Strategy	1- Educational strategy, collaborative concept planning. 2- Brainstorming education strategy. 3- Education Strategy Notes Series

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3h	Introduction to Control Systems			Assessment is based on hand-in assignments, written exams, Case studies,
2	3h	Open Loop & Closed Loop Control Systems			
3	3h	Transfer Function, Poles & Zeros of System, Stability			
4	3h	Mathematical Modelling of Mechanical Systems			

5	3h	Mathematical Modelling of Electrical Systems	Control	**Lectures and Tutorials**	Quizzes, seminars, Practical testing, and Online testing.
6	3h	Block Diagrams Representation of a Control System			
7	3h	Midterm Exam1			
8	3h	Signal Flow Graph			
9	3h	Mason's Gain Formula			
10	3h	Transient Response			
11	3h	Transient Response of First Order Systems			
12	3h	Transient Response of Second Order Systems			
13	3h	Midterm Exam2			
14	3h	Routh Herwitz Stability Criterion			
15	3h	Frequency Response Analysis			

11.

Tests: (10%)

Assignments: (10%)

Mid-Semester Exam: (20%)

Final Exam: (60%)

12.

	Modern Control Engineering, edited by Katsuhiko Ogata, Latest Edition
	Control Systems Engineering, edited by Norman S. Nise, Latest Edition
	https://en.wikipedia.org/wiki/Control_system

Signature: hadeel

Course administrator's Name: **Asst.Prof.Dr. Hdaeel Kassim Aljobouri**

Date: **12/ 9/ 2024**

Course Description Form

1. Course Name:

Control I

2. Course Code:

MDER 512

3. Semester / Year:

2023- 2024/ 5th

4. Description Preparation Date:

12/ 9/ 2024

5. Available Attendance Forms:

in-person only

6. Number of Credit Hours (Total) / Number of Units (Total)

3 Hours / 2 Units/ total= 45 hr

7. Course administrator's name (mention all, if more than one name)

Name: Asst.Prof.Dr. Hdaeel Kassim Aljobouri
Email: hadeel_bme77@yahoo.com

8. Course Objectives

Course Objectives	**This course has been designed to introduce the students to the basic theory of Feedback Control Systems. These early systems incorporated many of the same ideas of feedback that are in use today. After studying this, course students should be able to derive mathematical methods of physical systems and check the stability of control systems in the time domain.**

9. Teaching and Learning Strategies

Strategy	1- Educational strategy, collaborative concept planning. 2- Brainstorming education strategy. 3- Education Strategy Notes Series

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3h	Introduction to Control Systems			Assessment is based on hand-in assignments, written exams, Case studies,
2	3h	Open Loop & Closed Loop Control Systems			
3	3h	Transfer Function, Poles & Zeros of System, Stability			
4	3h	Mathematical Modelling of Mechanical Systems			

5	3h	Mathematical Modelling of Electrical Systems	Control	**Lectures and Tutorials**	Quizzes, seminars, Practical testing, and Online testing.
6	3h	Block Diagrams Representation of a Control System			
7	3h	Midterm Exam1			
8	3h	Signal Flow Graph			
9	3h	Mason's Gain Formula			
10	3h	Transient Response			
11	3h	Transient Response of First Order Systems			
12	3h	Transient Response of Second Order Systems			
13	3h	Midterm Exam2			
14	3h	Routh Herwitz Stability Criterion			
15	3h	Frequency Response Analysis			

11.

Tests: (10%)

Assignments: (10%)

Mid-Semester Exam: (20%)

Final Exam: (60%)

12.

	Modern Control Engineering, edited by Katsuhiko Ogata, Latest Edition
	Control Systems Engineering, edited by Norman S. Nise, Latest Edition
	https://en.wikipedia.org/wiki/Control_system

Signature: hadeel

Course administrator's Name: **Asst.Prof.Dr. Hdaeel Kassim Aljobouri**

Date: **12/ 9/ 2024**

Course Description Form

1. Course Name:
Control II
2. Course Code:
MDER 522
3. Semester / Year:
2024- 2025/ 5th
4. Description Preparation Date:
28/ 1/ 2025
5. Available Attendance Forms:
in-person only
6. Number of Credit Hours (Total) / Number of Units (Total)
6 Hours / 3 Units/ total= 90 hr
7. Course administrator's name (mention all, if more than one name)
Name: Asst.Prof.Dr. Hdaeel Kassim Aljobouri Email: hadeel_bme77@yahoo.com

8. Course Objectives	
Course Objectives	**This course aims to understand the purpose of a modern control system by examining examples of control systems through the course of history. After studying this course students should be able to derive mathematical methods of physical systems and check the stability of control systems in the frequency domain. The students should also be able to analyze the transient as well as steady−state behavior of linear time−invariant systems.**

9. Teaching and Learning Strategies	
Strategy	1- Educational strategy, collaborative concept planning. 2- Brainstorming education strategy. 3- Education Strategy Notes Series

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3h	Bode Plots			
2	3h	Nichols chart & Nyquist plots			
3	3h	Modern Control Theory			

4	3h	Mathematical Modeling of Dynamic Systems	Control 2	**Lectures and Tutorials**	Assessment is based on hand-in assignments, written exams, Case studies, Quizzes, seminars, Practical testing, and Online testing.
5	3h	State-Space Representation			
6	3h	Frequency Domain to time Domain Conversion in State-Space			
7	3h	Midterm Exam1			
8	3h	Transfer Matrix and Solution of State Equations			
9	3h	Controllability and Observability			
10	3h	Construction of Root Locus			
11	3h	Closed loop stability via Root Locus			
12	3h	Midterm Exam2			
13	3h	Steady-state error			
14	3h	Modes of controllers			
15	3h	Digital PID Tuning Rules			

11.

Tests: (5%)

Assignments: (5%)

Mid-Semester Exam: (15%)

Lab Sessions: (15%)

Final Exam: (60%)

12.

	Modern Control Engineering, edited by Katsuhiko Ogata, Latest Edition
	Control Systems Engineering, edited by Norman S. Nise, Latest Edition
	https://en.wikipedia.org/wiki/Control_system

Signature: *hadeel*

Course administrator's Name: **Asst.Prof.Dr. Hdaeel Kassim Aljobouri**

Date: **28/ 1/ 2025**

Course Description Form

1. Course Name:	
Biotribology	
2. Course Code:	
MDER522	
3. Semester / Year:	
2nd semester / 5th year	
4. Description Preparation Date:	
1.9.2024	
5. Available Attendance Forms:	
Attendance, only	
6. Number of Credit Hours (Total) / Number of Units (Total)	
2 hours / week, total = 30 hours	
7. Course administrator's name (mention all, if more than one name)	
Name: Dr. Sadiq J. Hamandi Email: sadiq.j.abbas@nahrainuniv.edu.iq	
8. Course Objectives	
Course Objectives	• Introduce the fundamentals of friction and its relevance in component design and surface engineering. • Introduce key tribological principles related to wear, methods for mitigation and underpinning mathematical concepts. • Introduce the theory of contact mechanics and evaluate its impact on the performance of components. • Develop the ability to apply lubrication science to engineering components. • To enable student to apply the above techniques to a range of engineering components, evaluate failure mechanisms and compare key design features that improve performance • Develop solutions to biotribological industrial design problems through the application of biotribological analysis.
9. Teaching and Learning Strategies	
Strategy	Assessment is based on hand-in assignments, written exam, Case study, Quizzes, seminars, Practical testing and Online testing.

10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Describe tribology	Introduction	Lecture	-
2	2	Identify the types of surfaces	Surfaces of the bodies	Lecture	Quiz
3	2	Categorize types of friction	Friction	Lecture	-
4	2	Categorize theory of friction	The Adhesion theory of friction	Discussion	-
5	2	Describe the characteristics of wear	Wear	Lecture	Quiz
6	2	Plan ways to model wear	Corrosion of implant materials	Lecture	-
7	2	Select wear measurement technique	Wear Measurements	Seminar	-
8	2		Midterm Exam 1		Mid Exams
9	2	Describe lubrication	Lubrication	Lecture	-
10	2	Categorize types of lubrication	Lubrication Mechanism	Lecture	-
11	2	Identify biotribology	Tribology of Human Joints	Lecture	Quiz
12	2	Develop lubrication	Types of lubrication of surfaces	Discussion	-
13	2	Link different type of synovial joints	Types of Lubrication specific to synovial joints	Lecture	Quiz
14	2	Classify artificial joints	Mechanisms of lubrication in artificial joints	Seminar	-
15	2		Midterm Exam 2		Mid Exams

11. Course Evaluation
Mid Exam 1: 15% Mid Exam 2: 15% Seminars: 10% Final Exam: 60%

12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Biotribology, Wiley
Main references (sources)	Biotribology Recent progresses and future perspective
Recommended books and references (scientific journals, reports...)	Design of Artificial Human Joints, Subrata
Electronic References, Websites	https://www.scimagojr.com/journalsearch.php?q=21100264506&tip=sid&clean=0

Course Description Form

1. Course Name: Engineering Management

2. Course Code: CREQ512

3. Semester / Year: 2nd semester/ 5th year

4. Description Preparation Date: 01/02/2025

5. Available Attendance Forms: Attendance only

6. Number of Credit Hours (Total) / Number of Units (Total): 1 hour/week, total = 15 hr

7. Course administrator's name (mention all, if more than one name)

Name: Dr Muna Mustafa Kareem
Email: muna.kareem@nahrainuniv.edu.iq

8. Course Objectives

Course Objectives	• Introduce principles of management and organizational structures. • Teach healthcare management and financial principles in healthcare. • Develop skills in risk identification, assessment, and safety promotion.

9. Teaching and Learning Strategies

Strategy	1- Lectures 2- Discussion in the classroom 3- Seminars

10. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1+2	2	Understand the general concepts of management	Introduction to Management	Lecture	1. Exams 2. Quizzes
3	1	Identify the different types of organizational	Organizational Structure and Span of Control	Lecture	

		structures with their advantages and disadvantages			
4+5	2	Defining the roles and functions of hospital management	Introduction to Hospital Management	Lecture	
Monthly Exam (1)					
7- 9	3	Know the responsibilities that must be covered by financial management, the budget preparation process, and financial control	Financial Management in Healthcare Organizations	Lecture	
10	1	Identify risks and take the necessary steps or measures to mitigate their harmful effects.	Risk Management	Lecture	
Monthly Exam (2)					
12	1	Understand, apply and improve materials management in healthcare	Materials Management	Lecture	
13	1	How to manage laboratories in health institutions and the most important materials and equipment in them	Laboratory management	Lecture	
14	1	Apply marketing strategies to promote health services	Marketing of Health Services	Lecture	
15	Final Exam				

11.Course Evaluation

1- Quizzes (15%)

2- 2 monthly exams (25%) 3- Attendance (5%) 4- Final exam (60%)	
12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	1. Gupta AK. Engineering Management. S. Chand Publishing, 2014. 2. Sakharkar B. Hospital Administration Principles of and Planning. Jaypee Brothers Medical Publishers, 2009.
Main references (sources)	Bhatia D, Chaudhari PK, Chaudhary B, et al. (eds). A Guide to Hospital Administration and Planning. Springer, 2023.
Recommended books and references (scientific journals, reports...)	Clinical Engineering Handbook (2nd edition), edited by Ernesto Iadanza, 2019.
Electronic References, Websites	

Course Description Form

I. Course Name:
Hospital design and system
II. Course Code:
MDER515
III. Semester / Year:
5th stage/ 1st semester/2025
IV. Description Preparation Date:
1/9/2023
V. Available Attendance Forms:
26/1/2025
VI. Number of Credit Hours (Total) / Number of Units (Total)
2 hrs./week..... 2 units
VII. Course administrator's name (mention all, if more than one name)
Name: Lec. Dr. Noor A. Sadek Email: noor.a.sadek@nahrainuniv.edu.iq
VIII. Course Objectives

Course Objectives	a. Functional Efficiency b. Educational Integration c. Creating a healing environment that promotes recovery. d. Ensuring that the hospital can expand to meet future demands e. Implementing design features that minimize the risk of infections, such as proper ventilation and easy-to-clean surfaces. f. Incorporating technology into the design to support medical procedures, data management, and educational activities. g. Using sustainable materials in Designing hospitals that are environmentally friendly and energy-efficient. h. Creating a positive learning environment by providing spaces for students to decompress, and collaborate. As well as areas that allow for quiet study.

IX. Teaching and Learning Strategies	
Strategy	Lectures +brain Strom+ explanations +discussions. Scientific visits to hospitals in Iraq.

X. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method

1	2	• Learning to Create Healing Spaces. • Understanding How Hospitals Function. • Prioritizing Safety and Cleanliness. • Designing for Everyone. • Thinking About the Future. • Learning to design while considering all of the people who utilize the space.	Hospitals	lectures	Weekly assessments
2			Hospitals planning		
3			Hospital design		
4			patient housing system		
5			patient housing system		
6			MID TERM -1		
7			Quiz- for GO2		
8			Support service system		
9			Scientific visit to Kadhymia teaching hospital		
10			Medical services department		
11			Medical services department		
12			MID TERM -2		
13			Seminars		
14			Stop learning week		
15			Final Examination		

XI. Course Evaluation

Distributing the score out of 40 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc

30 marks…..midterms.
5 marks….. quizzes.
5 marks….. weekly assessments.

XII. Learning and Teaching Resources

Required textbooks (curricular books, if any)	CODES FOR FEDRAL STANDERS
Main references (sources)	Hospital and Healthcare Facility Design" by Richar Miller. 2nd edition.

Recommended books and references (scientific journals, reports…)	Springer Scopus Nature
Electronic References, Websites	CODES FOR FEDRAL STANDERS ResearchGate Springer

Course Description Form

Biomedical Engineering Department

1. Course Name:
Nanotechnology
2. Course Code:
MDER516
3. Semester / Year:
first semester \ fifth stage 2024-2025
4. Description Preparation Date:
29\5\2025
5. Available Attendance Forms:
29\5\2025
6. Number of Credit Hours (Total) / Number of Units (Total)
30 hours for one semester \2 units
7. Course administrator's name (mention all, if more than one name)
Name: lect. Dr. Sarah Ashour Hamood Email: sarah.ashour@nahrainuinv.edu.iq
8. Course Objectives

Course Objectives	Enable students to be able to understand the 1- Modifies the molecular structure of materials to create smart objects. 2- To acquire the knowledge of importance of Nano-technology, Emergence, synthesis approaches of nanomaterials and challenges in Nano-technology 3- Materials design and development 4- Enhancing material performance 5- Sustainability and environmental considerations

9. Teaching and Learning Strategies

Strategy

- Theoretical study: (theoretical lectures supported by modern means of presentation and reinforced with the latest scientific sources and holding seminars in which students participate).
- Active Learning and Brainstorming
- Real-World Applications
- Collaborative Learning

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Nanotechnology	The History of Nanotechnology	Theoretical scientific lectures scientific / or interactive media presentations	Exam Quiz Reports Seminars
2	2	Nanotechnology	Concepts of Nanotechnology	Theoretical scientific lectures scientific / or interactive media presentations	Exam Quiz Reports Seminars
3	2	Nanotechnology	Carbon Nanomaterials (Carbon Allotropes)	Theoretical scientific lectures scientific / or interactive media presentations	Exam Quiz Reports Seminars
4	2	Nanotechnology	Synthesis of Nanomaterials 1	Theoretical scientific lectures scientific / or interactive media presentations	Exam Quiz Reports Seminars
5	2	Nanotechnology	Synthesis of Nanomaterials 2	Theoretical scientific lectures scientific / or interactive media presentations	Exam Quiz Reports Seminars
6	2	Mid Exam I			Mid Exam I

7	2	Nanotechnology	Gold nanoparticles (AuNPs)	Theoretical scientific lectures scientific / or interactive media presentations	Exam Quiz Reports Seminars
8	2	Nanotechnology	Synthesis of silver nanoparticles: chemical methods	Theoretical scientific lectures scientific / or interactive media presentations	Exam Quiz Reports Seminars
9	2	Nanotechnology	Synthesis of silver nanoparticles: physical methods	Theoretical scientific lectures scientific / or interactive media presentations	Exam Quiz Reports Seminars
10	2	Nanotechnology	Synthesis of silver nanoparticles: biological methods	Theoretical scientific lectures scientific / or interactive media presentations	Exam Quiz Reports Seminars
11	2	Mid exam II			Mid Exam II
12	2	Nanotechnology	Smart Materials 1	Theoretical scientific lectures scientific / or interactive media presentations	Exam Quiz Reports Seminars
13	2	Nanotechnology	Smart Materials 2	Theoretical scientific lectures scientific / or interactive media presentations	Exam Quiz Reports Seminars
14	2	Nanotechnology	Nanostructure Identification	Theoretical scientific lectures scientific	Exam Quiz Reports Seminars
15	final exam				

11.Course Evaluation	
Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports, seminar, ... etc 25 marks Midterm 10 marks Quizzes 5 marks Seminars Final (60%)	
12.Learning and Teaching Resources	
Required textbooks (curricular books, if any)	An Introduction to Nanoscience and Nanotechnology by Alain Nouailhat
Main references (sources)	Introduction to nano : basics to nanoscience and nanotechnology by Sengupta, Amretashis, editor.; Sarkar, Chandan Kumar, editor.; SpringerLink 2015
Recommended books and references (scientific Journals, reports...)	Biomaterials Science An introduction to materials in medicine by Buddy D. Ratner, Allan S. Hoffman, Frederick J. Schoen, Jack E. Lemons (z-lib.org)
Electronic References, Websites	Research gate

Course Description Form

Biomedical Engineering Department

1. Course Name:
Surgery for Biomedical Engineering
2. Course Code:
MDER525
3. Semester / Year:
second semester \ fifth stage 2024-2025
4. Description Preparation Date:
29\5\2025
5. Available Attendance Forms:
29\5\2025
6. Number of Credit Hours (Total) / Number of Units (Total)
30 hours for one semester with \3 units
7. Course administrator's name (mention all, if more than one name)
Name: lect. Dr. Sarah Ashour Hamood Email: sarah.ashour@nahrainuinv.edu.iq
8. Course Objectives

Course Objectives	➢ Enable students to be able to understand the main functions Imaging instruments ➢ Enable students to identify importance of these instruments ➢ To make students able to handle surgical imaging instruments ➢ Enable students to be able to understand the main functions of surgical instruments ➢ Understanding the collaboration of these instrument with others techniques and devices

9. Teaching and Learning Strategies

Strategy

- Theoretical study: (theoretical lectures supported by modern means of presentation and reinforced with the latest scientific sources and holding seminars in which students participate).

- Practical study: (teaching students to use different instruments

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	Surgical Engineering	Definition of Surgical Engineering	Theoretical scientific lectures scientific / or interactive media presentations	Oral questions during the lecture Exam Quiz Reports
2	4	Surgical Engineering	Tools and Technologies in Surgical Engineering	Theoretical scientific lectures scientific / or interactive media presentations	Oral questions during the lecture Exam Quiz Reports Seminars
3	4	Surgical Engineering	Robotic Surgical Systems	Theoretical scientific lectures scientific / or interactive media presentations	Oral questions during the lecture Exam Quiz Reports Seminars
4	4	Surgical Engineering	Medical Imaging Technologies CT and MRI	Theoretical scientific lectures scientific / or interactive media presentation s	Oral questions during the lecture Exam Quiz Reports Seminars
5	4	Surgical Engineering	Medical Imaging Technologies Ultrasound and Fluoroscopy	Theoretical scientific lectures scientific / or interactive media presentation s	Oral questions during the lecture Exam Quiz Reports Seminars
6	4	Mid Exam I			Mid Exam I

7	4	Surgical Engineering	Laparoscopic Instruments	Theoretical scientific lectures scientific / or interactive media presentations	Oral questions during the lecture Exam Quiz Reports Seminars
8	4	Surgical Engineering	Surgical Navigation Systems 1	Theoretical scientific lectures scientific / or interactive media presentations	Oral questions during the lecture Exam Quiz Reports Seminars
9	4	Surgical Engineering	Surgical Navigation Systems 2	Theoretical scientific lectures scientific / or interactive media presentations	Oral questions during the lecture Exam Quiz Reports Seminars
10	4	Surgical Engineering	3D Printing for Surgical Planning and Implants 1	Theoretical scientific lectures scientific / or interactive media presentations	Oral questions during the lecture Exam Quiz Reports Seminars
11	4	Mid exam II			Mid Exam II
12	4	Surgical Engineering	Tele-surgical devices	Theoretical scientific lectures scientific / or interactive media presentations	Oral questions during the lecture Exam Quiz Reports
13	4	Surgical Engineering	Wearable and Implantable Devices	Theoretical scientific lectures scientific / or interactive media presentations	Oral questions during the lecture Oral questions during the lecture Exam Quiz Reports
14	4	Surgical Engineering	Telemedicine with surgical engineering	Theoretical scientific lectures scientific	Oral questions during the lecture Exam Quiz Reports
15	final exam				

11.Course Evaluation	
Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports, seminar, ... etc 20 marks Midterm 15 marks practical 5 marks Quizzes Final (60%)	
12.Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Engineering for Surgery text book by NP Belfiore · 2020
Main references (sources)	- Quantitative Biomedical Optics.Theory, Methods, and Applications; by Irving J. Bigio, Sergio Fantini. - Biomedical Engineering Fundamentals by Joseph D. Bronzino, Donald R. Peterson
Recommended books and references (scientific Journals, reports...)	- Handbook of Biomedical Telemetry Nikita, Konstantina S Piscataway, NJ: John Wiley & Sons, Inc; 2014
Electronic References, Websites	Research gate

Course Description Form

1. Course Name:

Diagnostic Instruments

2. Course Code:

MDER511

3. Semester / Year:

1st / 2024-2025

4. Description Preparation Date:

24.2.2025

5. Available Attendance Forms:

Attendance only

6. Number of Credit Hours (Total) / Number of Units (Total)

4 hours / week, total =56 hr

7. Course administrator's name (mention all, if more than one name)

Name: Asst. Prof. Dr. Auns Q. Al-Neami
Email: Auns.q.hashim@nahrainuniv.edu.iq

8. Course Objectives

9. Teaching and Learning Strategies

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	1.To learn the basic concepts of medical instrumentation systems and understand how they differ from other conventional systems. 2.To learn the objectives, parts, and Components of medical instrumentation systems used in different fields of medicine. 3.To design different clinical instrumentatio systems.	Medical Ultrasound	Theoretical scientific lectures	
2	4		Basic Modes of Transmission of Ultrasound		
3	4		Pulsed and Continuou Doppler Ultrasound		
4	4		Doppler Blood Flow	Scientific interactive presentations	
5	4		Ultrasound Imaging Monitoring Systems		
6	4		Ultrasound transducer	Theoretical scientific lectures	
7	4		Multi element transdu		

8	4	4.To learn how to solve problems related to medical instrumentation. 5.To describe the block diagram and electronic circuit diagram in preparation for implementation.	Echoencephalography	Scientific interactive presentation	
9	4		Echocardiography	Theoretical scientific lectures	
10	4		Patient Monitoring Systems, Medical oscilloscopes, types of Scopes	Theoretical scientific lectures	
11	4		Endoscopy, Types of Endoscopes,	Scientific interactive presentation	
12	4		Capsule Endoscopes		
13	4	6.To simulate some of the medical signals such as ECG and EEG. 7.To understand the working principles of each medical instrument.	Monitoring Hardware certain Circuits.	Theoretical scientific lectures	
14	4		Monitoring Hardware certain Circuits.	Theoretical scientific lectures	
15	4		Examination		
16	4				

11.Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation monthly, or written exams, reports,…etc.
Mid-Terms: 20%
Laboratory: 15%
Quizzes: 5%

12.Learning and Teaching Resources

Required textbooks (curricular books, if any)	
Main references (sources)	
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Biomedical Sensors**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MDER522**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level		UGV	**Semester of Delivery**		10
Administering Department		Biomedical Engineering	**College**	College of Engineering	
Module Leader	Dr. Auns Q. Hashim		**e-mail**	uns_alneami@yahoo.com	
Module Leader's Acad. Title		Assist Prof	**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		01/06/2023	**Version Number**		1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	MDER210	**Semester**	Three
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	The student will be able: 1. 1- To learn basic concepts of biomedical sensor. 2. 2- To understand a biomedical sensors fundamentals and design. 3. 3- To learn the suitable application of each sensor. 4. 4- To describe the types of biomedical sensors and principle of work.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Course is designed to learn the student three principles: 1. Mathematics concepts. 2. How to measure the electrical signals from the body by these sensors. 3. How to recognize the suitable type of sensors.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. General definition, Characteristics, Principles and requirements, Electrodes, definition, electronic CCT, types Transducers, properties, types Resistive transducers Thermometric transducer and medical application, Photoelectric transducers and medical application, Photomultiplier , scintillation counter and their applications, Piezoelectric and ultrasound transducers and medical applications, Chemical transducers and medical applications, Pressure measurement transducers, Motion and force sensors and medical applications [45 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Assessment is based on hand-in assignments, written exam, Case study, Quizzes, seminars, Practical testing and Online testing.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
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)	4, 12	LO #1, 2 and 3
	Assignments	2	10% (10)	7, 13	LO #1, 2 and 3
	Projects / Lab.	1	10% (10)	Continuous	
	Report	1	10% (10)	13	LO #1, 2 and 3
Summative assessment	**Midterm Exam**	3 hr	10% (10)	6,11,15	LO # 1,2 and 3
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	General definition, Characteristics, Principles and requirements
Week 2	Electrodes, definition, electronic CCT, types
Week 3	Transducers, properties, types
Week 4	Resistive transducers
Week 5	Thermometric transducer and medical application
Week 6	Semester Examination 1
Week 7	Photoelectric transducers and medical application
Week 8	Photomultiplier

Week 9	scintillation counter and their applications, seminars
Week 10	Piezoelectric and ultrasound transducers and medical applications
Week 11	Semester Examination 2
Week 12	Chemical transducers and medical applications/ seminars
Week 13	Pressure measurement transducers
Week 14	Motion and force sensors and medical applications/seminars
Week 15	Semester Examination 3
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Sensors in Biomedical Applications: fundamentals technology and applications, 2000.	Yes
Recommended Texts	Biomedical Transducers and Instruments, Tatsuo Togawa, 2006.	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.