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

Academic Program and Course Description Guide

2025-2026

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 2025-2026

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: 12/09/2025
File Completion Date: 1 / 05/ 2026

Signature:

Head of Department Name:

Prof. Dr. Auns Q. Al-Neami

Date: / / 2026

Signature:

Scientific Associate Name:

Asst. Prof. Dr. Abbas Al-Farraji

Date: / / 2026

The file is checked by:
Department of Quality Assurance and **University Performance**
Director of Quality Department Assurance and **University Performance: Asst. Prof. Dr. Yasser Imad Abdulaziz**
Date: / / 2026

Signature:

Approval of the Dean
Prof. Dr. Ayad Murad Takhakh

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	**Medical Chemistry**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	MDER 110				
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. Dunia Tahseen Nema		**e-mail**	dunia.t.nema@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	28/01/2026		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	Physiology I & II	**Semester**	1 and 2 in 3rd year

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	Course is designed to learn the student 7 main principles: 1- Philosophy of chemistry in medicine & biomedical engineering. 2- To apply this philosophy in work field. 3- To get a practical skill. 4-To develop problem solving skills and developing professional capabilities 5- To deals with the basic concept of clinical biochemistry and related devices and instrument 6. To interpretation the chemical pathways among main molecules in human body (carbohydrate, protein, lipids)and understanding its methods measurements
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	The student will be able : 1. To understands the concept of occupational safety, especially when working in hospitals and medical laboratories, through his understanding of warning signs and methods of prevention from the dangers resulting from the use of chemicals. 2. To learn about glassware and laboratory equipment and how to deal with them 3. Clarification and measurement of some properties of chemicals 4. To learn how to prepare, measure and calculate standard solutions, and determine concentration by titration. 5. To learn basic concepts of separation, chemical subjects and some technical methods related with biomedical engineering. 6. Learn about the concept of acidity and alkalinity, the method of measuring them, and Buffer molecules and systems (blood, lungs, and kidneys) in the human body. 7. Recognizing the role of some types of chemistry, such as nuclear chemistry, in treatment and diagnosis. 8. Knowing the applications of pressure laws and their impact on the chemo physiological processes in the human body, such as breathing processes (inhalation and exhalation). 9. Learn the steps to achieve balance for the organism, especially the human being, and how to maintain the homeostasis of human body. 10. To know about human blood and its component and understand about

	separation serum or plasma from hole blood. 11. To recognize the main chemical molecule (carbohydrate, proteins and lipids) in human body and the relationship among them to understand normal and abnormal cases that related to metabolism. 12. To recognize other important chemical molecule(Hormones, enzymes, vitamins and minerals), and clarify its role in the body and its impact on the various vital processes in the human body
Indicative Contents المحتويات الإرشادية	Indicative content includes the following:- <u>Part A – General chemistry</u> Solutions, solution terminology (solubility, factor influencing solubility, saturated solutions, unsaturated solutions, supersaturated solutions) [4 hrs.] , dilutions, isotonic solutions, aqueous solutions, ionic solutions, electrolytes and non-electrolytes. [5 hrs.] Acids& Bases, measuring pH, acid- base titration, buffer solutions, blood buffers and buffering capacity in blood. [4 hrs.] Nuclear chemistry , Isotopes, Radioactivity, type of radiation, properties of Alpha, Beta and Gamma radiation, Ionizing radiation, Units, detection devices, physiological effects of radiation, radioactive decay series, nuclear reactions, half – life, uses of radioisotopes(especially in medicine). [4 hrs.] Gases, Ideal gas laws, Boyle, s low, Charle,s low , Gay- Lussac, s low, The combined gas low, and Dalton, s low, Gas low and breathing, the combined gas low, and Dalton, s low, Gas low and breathing [4 hrs.] <u>Part B – Biochemistry</u> Introduction, metabolism (anabolism and catabolism), homeostasis, [4 hrs.] Blood [4 hrs.]. Carbohydrates (definitions, functional group, characteristics, reactions) [8 hrs.] Proteins (definitions, functional group, characteristics, reactions) [4 hrs.] Lipid (definitions, functional group, characteristics, reactions). [2 hrs.] Lipid profile, Body mass index (BMI). [4 hrs.] Interpretation of metabolism (pathways of metabolism, disease due to error in metabolism) [12 hrs.] Hormones, vitamins and minerals. [4 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
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
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**	4/2	8% (8)	2,5,6, 11,12	LO #1,2,4,6,7,8 10 and 11
	Assignments	4/2	8% (8)	4,6,8	LO# 4,6,8
	Projects / Lab.	5/3	15% (15)	Continuous	
	Report	3/3	%9	-	-
Summative assessment	**Midterm Exam**	3hr	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	Solutions, solution terminology (solubility, factor influencing solubility, saturated solutions, unsaturated solutions, supersaturated solutions)
Week 2	Dilutions, isotonic solutions, aqueous solutions,
Week 3	Ionic solutions, electrolytes and non-electrolytes.

Week 4	Acids& Bases, measuring pH, acid- base titration, buffer solutions, blood buffers and buffering capacity in blood.
Week 5	Nuclear chemistry , Isotopes, Radioactivity, type of radiation, properties of Alpha, Beta and Gamma radiation, Ionizing radiation, Units, detection devices, physiological effects of radiation, radioactive decay series, nuclear reactions, half – life, uses of radioisotopes(especially in medicine).
Week 6	Gas low and breathing
Week 7	Introduction, metabolism (anabolism and catabolism), homeostasis.
Week 8	blood
Week 9	Carbohydrates (definitions, functional group, characteristics, reactions).
Week 10	Proteins (definitions, functional group, characteristics, reactions).
Week 11	Lipid (definitions, functional group, characteristics, reactions). Lipid profile, Body mass index (BMI).
Week 12	Interpretation of metabolism (pathways of metabolism, disease due to error in metabolism) PART I
Week 13	Interpretation of metabolism (pathways of metabolism, disease due to error in metabolism) PART II
Week 14	Hormones
Week 15	Vitamins and minerals.
Week 16	Final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: introduction , Laboratory safety practices
Week 2	Lab 2: chemical glassware
Week 3	Lab 3: prepare standard solution
Week 4	Lab 4: Determine the exact concentration of HCl solution (by titration)
Week 5	Lab 5: Identify an unknown chemical mixture
Week 6	Lab 6: Identify and distinguish carbohydrate

Week 7	Lab 7: Identify and distinguish proteins
Week 8	Lab 7: Identify and distinguish lipid + measuring body mass index (BMI)
Week 9	Lab 7: Separation of human blood and measuring the level of plasma glucose in blood
Week 10	Lab 8: Exam

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Lippincott's lllustrated Reviews by Richard A. Harvey , 5th edition, 2011. The chemical basis of life, by George H. Schmid, ph.D, Little, Brown and company Boston 1982.	Yes
Recommended Texts	Handbook of chemistry and physics, by Holden,N. E., 2000 . Clinical Biochemistry and metabolic medicine by Martin Andrew Crook, 2012	No
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	**Mathematics**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MATH110**				
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	Mahmood Hameed Majeed Doaa Nawfal Hazim		**e-mail**	Mahmood.h.majeed@nahrainuniv.edu.iq Doaanawfal@alnahrainuniv.edu.iq	
Module Leader's Acad. Title	Lecturer/asst. lect		**Module Leader's Qualification**	Ph.D./MSc.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	3/09/2025		**Version Number**	2.0	

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

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (5)	5, 10	LO #3, 4
	Online Assignments	2	10% (5)	3,9	All
	On site Assignments	2	10% (5)	4	All
	reports	1	10% (10)	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	**Electrical Circuits I**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MDER111**				
ECTS Credits	**8**				
SWL (hr/sem)	**200**				
Module Level	1		**Semester of Delivery**	1	
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	Lec.		**Module Leader's Qualification**	PhD	
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	01/09/2025		**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). [4hrs] • Ohm's law, Energy, and Power. [4 hrs] • Kirchhoff's & divider's Laws. [4 hrs] • Series, Parallel, and Series-Parallel Circuits. [8 hrs] • Theorems: Norton, Nodal, Mesh, Source Transformation, Maximum Power Transfer, Thevenin and Superposition. [18 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	93	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	107	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	7.13
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	200		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (5)	Continuous	LO # 1-15
	Online Assignments	2	10% (2)	Continuous	LO # 1-15
	Online assignments	1	5% (5)	Continuous	LO # 1-15
	Lab. Quizzes	2	10% (5)	Continuous	
	Lab. Report	5	5% (1)	Continuous	LO # 1-15
Summative assessment	**Midterm Exam**	2 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	**Computer Fundamentals and Programming I**			**Module Delivery**	
Module Type	**Basic learning activities**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**URCOM111**				
ECTS Credits	**3**				
SWL (hr/sem)	**75**				
Module Level	1 UGI		**Semester of Delivery**	1	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Reem Shakir Mahmood		**e-mail**	Reem.sh.mahmood@nahrainuniv.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	Ph.D	
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	The primary aim of this module is to equip students with fundamental knowledge and skills in computer concepts, applications, and technologies. This module introduces learners to essential computer operations, productivity software, and internet-based tools, preparing them for academic, professional, and personal use of technology. Specifically, the module aims to: 1. **Provide foundational knowledge** of computer systems, components, and operating principles, enabling students to understand how computers function. 2. **Foster practical skills** in using productivity tools such as word processors, spreadsheets, and presentation software for academic and professional tasks. 3. **Introduce operating systems and graphical user interfaces (GUI)** to enable students to efficiently navigate and operate computer systems. 4. **Develop an understanding** of internet fundamentals, web browsing, email communication, and cloud computing services to enhance online productivity and collaboration. 5. **Encourage proficiency in digital communication tools**, including email and cloud-based platforms, to promote effective and secure communication. 6. **Prepare students for exams** and assessments while fostering independent learning and critical thinking about modern technological trends.

Module Learning Outcomes
 	
مخرجات التعلم للمادة الدراسية
	By the end of this module, students will be able to:
	
	1. **Understand and Explain Computer Basics**
	  a. Describe the fundamental concepts of computers, including hardware, software, data, and information processing.
	  b. Identify the components of a computer system and explain their roles and functions.
	2. **Use Operating Systems and Graphical User Interfaces (GUI)**
	  a. Navigate an operating system effectively, including file management and system settings.
	  b. Demonstrate the ability to operate computers with different GUIs (e.g., Windows, macOS).
	3. **Create and Edit Documents Using Word Processing Software**
	  a. Develop skills in creating, formatting, and editing documents.
	  b. Utilize advanced features like tables, images, headers/footers, and templates for professional documentation.
	4. **Work with Spreadsheet Software**
	  a. Perform basic and advanced data entry, calculations, and formatting.
	  b. Use functions, formulas, and charts for data analysis and visualization.
	5. **Design and Deliver Presentations**

	a. Create and organize professional presentations using presentation software. b. Apply transitions, animations, and multimedia effectively to engage audiences. 6. **Understand and Use the Internet and Web Browsers** a. Explain the basics of computer networks, including LAN, WAN, and the internet. b. Use web browsers to navigate the internet, search for information, and understand URLs, domain names, and IP addresses. 7. **Communicate Effectively via Email** a. Compose, send, and manage emails, including attachments. b. Follow email etiquette and ensure secure communication. 8. **Understand Cloud Computing and Services** a. Define cloud computing and describe its basic principles. b. Utilize cloud-based tools and services for file storage, collaboration, and sharing. 9. **Develop Digital Literacy and Critical Thinking** a. Apply knowledge of computer concepts to solve practical problems. b. Demonstrate digital literacy by using computer applications and internet resources responsibly and efficiently. 10. **Prepare for Midterm and Final Assessments** a. Review and demonstrate mastery of course content through structured evaluations.
Indicative Contents المحتويات الإرشادية	**Basics of Computer Concepts** • **Introduction to Computers** o Definition, evolution, and classification of computers. o Difference between hardware, software, and firmware. o Data and information processing. • **Computer Components** o Input devices: Keyboard, mouse, scanners, and peripherals. o Output devices: Monitors, printers, and projectors. o Internal components: CPU, memory (RAM/ROM), storage devices (HDD, SSD), and motherboard. **2. Operating System and Graphical User Interface (GUI)** • Introduction to operating systems (e.g., Windows, Linux). • File management: Creating, organizing, and managing folders and files. • Navigating GUIs: Desktop, taskbar, menus, and shortcuts. **3. Productivity Software** • **Word Processing** o Basics of creating, editing, and formatting documents. o Using tools like tables, headers/footers, images, and templates. o Document review and collaboration features.

	• **Spreadsheet Software**
	  ○ Basics of data entry and cell formatting.
	  ○ Functions and formulas for calculations.
	  ○ Creating and formatting charts and graphs.
	• **Presentation Software**
	  ○ Designing slides: Themes, layouts, and multimedia integration.
	  ○ Transition and animation effects.
	  ○ Preparing slide shows and printing handouts.
	
	4. Internet and Web Browsing
	
	• Introduction to networks: LAN, WAN, and the internet.
	• Web browsers: Features and functionalities.
	• Search engines and advanced search techniques.
	• Understanding URLs, domain names, and IP addresses.
	
	5. Communication Tools
	
	• **Emails**
	  ○ Composing, sending, and managing emails.
	  ○ Attachments and email etiquette.
	  ○ Spam and phishing awareness.
	
	6. Introduction to Cloud Computing and Services
	
	• Definition and types of cloud computing: Public, private, and hybrid clouds.
	• Examples of cloud services: Google Drive, OneDrive, and Dropbox.
	• Advantages of cloud computing for collaboration and storage.
	
	7. Additional Concepts and Midterm Review
	
	• Overview of personal computers and their applications.
	• Integration of hardware, software, and internet tools.
	• Midterm exam preparation and review of key concepts.

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 C++ programming. 2. **Lab Sessions:** Hands-on practice with programming exercises to apply what's learned in lectures. 3. **Assignments:** Individual tasks to write C++ 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	**Theory**	**Quizzes**	2	5% (10)	Continuous	LO #1-15
		Onsite assignments	5	1% (5)	Continuous	LO #1-15
		Homework	5	1% (5)	Continuous	LO # 1-15
		Report	1	5% (5)	Continuous	LO # 1-15
	Lab		3	5% (15)	Continuous	LO # 1-15
Summative assessment	**Midterm Exam**		1	10% (10)	Continuous	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	Basics of computer concepts: Introduction to Computer
Week 2	Basics of computer concepts: Computer Components
Week 3	Operating System and Graphical User Interface (GUI)
Week 4	Word Processing
Week 5	
Week 6	Spread Sheet
Week 7	
Week 8	MID Exam 1
Week 9	Presentation Software
Week 10	
Week 11	Introduction to Internet and Web Browsers
Week 12	Communications and Emails
Week 13	
Week 14	Introduction to Cloud Computing and Services
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 Computer
Week 2	Basics of computer concepts: Computer Components
Week 3	Operating System and Graphical User Interface (GUI)
Week 4	Word Processing
Week 5	
Week 6	Spread Sheet
Week 7	
Week 8	Presentation Software
Week 9	
Week 10	Introduction to Internet and Web Browsers
Week 11	
Week 12	Communications and Emails
Week 13	
Week 14	Introduction to Cloud Computing and Services
Week 15	Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	**1- Absolute Beginners Guide to Computing 1st ed. Edition ,** by Wallace Wang **2- Computers Made Easy: From Dummy To Geek,** by James Bernstein **3- Computer Basics Absolute Beginner's Guide, Windows 10 Edition 9th Edition,** by Michael Miller	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	**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**	2	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Assis. Prof. Dr. Eman Ghadhban Khalil		**e-mail**	Eman.g.khalil@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	01/03/2026		**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	21% (7)	4,8, 11	LO # 1, 2, 3, 7 and 8
	Onsite Assignment	1	4% (4)	2-14	LO # 1-15

	Seminars	1	10% (10)	14,15	LO # 1-15
	Report	1	5% (5)	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	Midterm Exam
Week 8	The nucleus, transcription, translation
Week 9	Cell division, control of cell division, Reproductive cell division, cellular diversity, aging and cells
Week 10	The reactants and products of cellular respiration and where these reactions occur in a cell
Week 11	The process of glycolysis and identify its reactants and products
Week 12	The process of pyruvate oxidation and identify its reactants and products
Week 13	The process of the citric acid cycle (Krebs cycle) and identify its reactants and products
Week 14	The respiratory chain (electron transport chain) and its role in cellular respiration+ **Seminars**
Week 15	**Seminars**
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	Medical Physics			**Module Delivery**	
Module Type	Basic			☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Reports**	
Module Code	**MDER121**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	1		**Semester of Delivery**	2	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Dr. Muna Mustafa Kareem		**e-mail**	Muna.kareem@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	01/03/2026		**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. Understand the physical principles of force, pressure, and heat as they apply to human anatomy and physiological functions. 2. Develop technical understanding of light and X-ray physics for medical diagnostic applications. 3. Analyze the physical properties of the skeleton, lungs, and body fluids to determine how biological systems respond to internal and external physical forces.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Quantities and Units in Medical Physics: Master SI, CGS, and Imperial systems, applying conversion factors and scientific notation to clinical quantities. 2. Forces on and in the Human Body: Apply Newton's laws, biomechanical levers, and torque to analyze equilibrium, gravity effects, and sedimentation. 3. Physics of the Human Skeleton: Evaluate bone mechanical properties using stress-strain curves, Hooke's Law, and Young's Modulus to understand fracture mechanisms. 4. Temperature and Heat in the Human Body: Analyze heat transfer, measurement tools, and therapeutic applications including thermography and cryosurgery. 5. Pressure in the Human Body: Quantify pressure in physiological systems—including blood, intraocular, and intracranial—and study the physics of Hyperbaric Oxygen Therapy. 6. Physics of Lungs and Breathing: Apply Laplace's and Dalton's laws to analyze gas exchange, airway surface tension, and lung capacities via spirometry. 7. Electricity within the Body: Define resting/action potentials and cardiac conduction to interpret bio-signals (ECG, EMG, EEG) and the function of pacemakers. 8. Light in Medicine: Study optical properties for fiber optic endoscopy, microscopy, and the medical application of lasers and UV/IR light. 9. Physics of Diagnostic X-Rays: Analyze X-ray production, tissue attenuation, and the technical foundations of radiography, fluoroscopy, and CT scans.
Indicative Contents المحتويات الإرشادية	**Indicative content includes the following.** This course provides a comprehensive introduction to medical physics, covering a wide range of topics. Key areas include: • Introduction to Medical Physics • Forces on and in the body • Physics of the skeleton • Temperature and Heat in the Human Body • Pressure in the Human Body • Physics of Lungs and Breathing

	• Light in Medicine • Physics of Diagnostic X-Rays

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
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.46
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**	5	10% (10)	Continuous	LO #1, 2, 6
	Assignments/ Lab.	5	15% (15)	Continuous	LO # 3, 6
	Homework	1	5% (5)	6	
	Report	1	10% (10)	13	LO # 4, 7
Summative assessment	**Midterm Exam**	2* 3 hr	10% (10)	7 & 12	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 medical physics

Week 2	Forces on and in the body
Week 3	Physics of the skeleton
Week 4	Temperature and Heat in the Human Body
Week 5	Pressure in the Human Body
Week 6	Physics of Lungs and Breathing
Week 7	1st Mid-term Exam
Week 8	Mechanics of non-viscous fluids, Archimedes' principle, continuity equation, Bernoulli's equation.
Week 9	Electricity within the Body
Week 10	Electricity within the Body
Week 11	Light in Medicine
Week 12	2nd Mid-term Exam
Week 13	Physics of Diagnostic X-Rays
Week 14	Seminars
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	Medical Physics book by John R.Cameron and James G. Skofronick	Yes
Recommended Texts		
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	**Fundamentals of Engineering Mathematics**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MATH120**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	1		**Semester of Delivery**	2	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Mahmood Hameed Majeed Doaa Nawfal Hazim		**e-mail**	Mahmood.h.majeed@nahrainuniv.edu.iq Doaanawfal@alnahrainuniv.edu.iq	
Module Leader's Acad. Title	Lecturer/asst. lect		**Module Leader's Qualification**	Ph.D./MSc.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	26/08/2025		**Version Number**	2.0	

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

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (5)	5, 10	LO # 2, 4
	Online Assignments	2	10% (5)	3,9	All
	On site Assignments	2	10% (5)	4	
	reports	1	10% (10)	8	
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	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	**Electrical Circuits II**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	MDER120				
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	Dr. Jassim Mohammed Sahan Lect. Faten Imad Ali		**e-mail**	jassim.m.sahan@nahrainuniv.edu.iq faten.imad@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	01/02/2026		**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). [6 hrs] • Complex Numbers & Phasors. [4 hrs] • The response of the basic elements R, L, and C to a sinusoidal voltage or current. [6 hrs] • Power Forms in AC Circuits. [4 hrs] • Series, Parallel, and Series-Parallel Circuits. [8hrs] • Theorems: Norton, Nodal, Mesh, Source Transformation, Maximum Power Transfer, Thevenin and Superposition. [28 hrs] • Delta-Star Networks. [4 hrs] • Resonance In Electric Circuits [8 hrs] • Revision problem classes [10 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	123	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	8
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	77	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	200		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (5)	Continuous	LO # 1-15
	Online Assignments	2	10% (2)	Continuous	LO # 1-15
	Online assignments	1	5% (5)	Continuous	LO # 1-15
	Lab. Quizzes	2	10% (5)	Continuous	
	Lab. Report	5	5% (1)	Continuous	LO # 1-15
Summative assessment	**Midterm Exam**	2 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 - 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 Norton Theorem
Week 11	Maximum Power Transfer 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. Lec. Arkan Saad Mohammed Raaof		**e-mail**	Arkan.alkzzaz@nahrainuniv.edu.iq	
Module Leader's Acad. Title	Assistant. Lecturer		**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	01/06/2025		**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	Human rights and democracy			**Module Delivery**	
Module Type	**B**			☒ **Theory** ☒ **Lecture** **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	-				
ECTS Credits	2.00				
SWL (hr/sem)	50				
Module Level		1	**Semester of Delivery**		2
Administering Department		Type Dept.Code	**College**	Type College Code	
Module Leader	Assistant teacher: Doaa dheyaa		**e-mail**	Doaa.dheyaa@nahrainuniv.edu.iq	
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		Master
Module Tutor	Name (if available)		e-mail	e-mail	
Peer Reviewer Name		Name	**e-mail**	e-mail	
Scientific Committee Approval Date			**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Crimes 0f Defunct Baath party	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. الدفاع عن كرامة الإنسان 2. تمكين الطالب من معرفة اساسيات الدفاع عن حقوقه وحقوق الاخرين 3. تعزيز فكرة الديمقراطية.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. فهم الطالب للمادة الدراسية 2. • تعزيز سبل التعليم التفاعلي و تعزيز سبل المشاركة في الشأن العام – المواطنة 3. • تعزيز مشاعر التضامن مع الآخرين.
Indicative Contents المحتويات الإرشادية	تعايش الطلبة مع بعضهم على انهم افراد في مجتمع متكامل وحثهم على حب الوطن والولاء المطلق له ومعرفة مبادئ حقوق الانسان الضرورية ومبادئ الديمقراطية.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	هناك العديد من الاستراتيجيات التي يمكن استخدامها في تدريس مادة حقوق الانسان والديمقراطية من ابرزها: 1-المشاركة الصفية من خلال المناقشات والمداخلات 2- محاضرات حضورية للإعطاء المادة بالتفصيل 3- اعداد تقارير تستند على مصادر منهجية مختلفة من قبل الطلبة بشكل مجموعات تخص المنهج

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	.2.
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	,1113	LO #1,2,and#10,#11
	Lab	-	-		-
	Projects	1	10% (10)	Continuous	All

	Report	1	10%(10)	Continuous	-
Summative assessment	**Midterm Exam**	1hr	10% (10)	8	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	عرض مفردات مادة الفصل الاول على الطلبة والخطة الدراسية بغية الالتزام بتنفيذها
Week 2	مفهوم حقوق الانسان
Week 3	الانتهاكات الجسيمة لحقوق الانسان
Week 4	مجلس حقوق الانسان واليات حماية الحقوق
Week 5	التحديات المعاصرة لحقوق الانسان
Week 6	الديمقراطية
Week 7	فصل السلطات ومبادئ الحكم الديمقراطي
Week 8	امتحان
Week 9	ضمانات دور الاعلام
Week 10	التحول الرقمي في الديمقراطية
Week 11	كوز+تقارير
Week 12	الانظمة الديمقراطية المقارنة
Week 13	التجربة الديمقراطية في العراق
Week 14	مراجعة المقرر
Week 15	مراجعة المقرر

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	منهاج حقوق الانسان والديمقراطية	نعم
Recommended Texts		نعم
Websites	مواقع الانترنيت	

Grading Scheme
مخطط الدرجات

ثابت بدون تغيير

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	**Introduction to Biomedical Engineering**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	MDER124				
ECTS Credits	**2**				
SWL (hr/sem)	**75**				
Module Level	1		**Semester of Delivery**	2	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Dr. Safa Layth Kailan		**e-mail**	Safa.layth@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	3/2/2026		**Version Number**	1.0	

Module description

This course provides an introductory overview of the field of biomedical engineering. It explores the historical development of the discipline and its interdisciplinary nature, combining principles from engineering, biology, and medicine. The course covers major areas within biomedical engineering, including biomaterials, biomechanics, medical imaging, bioinstrumentation, and medical devices. Students will learn about the roles and responsibilities of biomedical engineers in healthcare, research, and industry. The course also introduces the design, function, and applications of medical devices. In addition, ethical issues and professional responsibilities related to biomedical engineering are discussed, with emphasis on patient safety, standards, and regulations.

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Introduction to Biomedical Engineering	**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 introduce students to the basic concepts and history of biomedical engineering. 2. To familiarize students with the main fields and applications of biomedical engineering. 3. To explain the role of biomedical engineers in healthcare systems. 4. To provide basic knowledge about medical devices and their functions. 5. To highlight ethical and professional responsibilities in biomedical engineering.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the end of this course, students will be able to: 1. Define biomedical engineering and describe its historical development. 2. Identify major fields within biomedical engineering. 3. Explain the role of biomedical engineers in solving medical problems. 4. Recognize basic types of medical devices and their applications. 5. Understand ethical principles and professional responsibilities in the field.
Indicative Contents المحتويات الإرشادية	• Introduction to biomedical engineering and its interdisciplinary nature • Historical background and evolution of biomedical engineering • Overview of human anatomy and physiology for engineers • Major fields of biomedical engineering (biomaterials, biomechanics, bioinstrumentation, medical imaging) • Fundamentals of medical devices and their classification • Principles of operation of common medical equipment • Design considerations and safety requirements for medical devices • Role of biomedical engineers in hospitals, industry, and research • Regulatory standards and quality assurance in medical devices • Ethical issues in biomedical engineering (patient safety, data privacy, professional conduct) • Case studies and real-world applications • Emerging trends and recent advancements in biomedical 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	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	42	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.8
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	10% (5)	Continuous	LO # 1-11
	Assignments	5	10% (2)	Continuous	LO # 1-11
	Seminar	1	10% (1)	Continuous	LO # 1-11
	Reports	1	10% (1)	Continuous	LO # 1-11
Summative assessment	**Midterm Exam**	3 hr	10% (10)	8,15	LO # 1 and 7
	Final Exam	3hr	50% (50)	15	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to Biomedical Engineering
Week 2	History and Development of Biomedical Engineering
Week 3	Role of Biomedical Engineers in Healthcare
Week 4	Overview of Human Body Systems (Basic Concepts)
Week 5	Biomaterials and Their Applications
Week 6	Biomechanics (Basic Principles)
Week 7	Bioinstrumentation
Week 8	Medical Imaging (X-ray, MRI, Ultrasound Basics)
Week 9	Mid Exam.1
Week 10	Ethics in Biomedical Engineering
Week 11, 12	Case Studies in Biomedical Engineering
Week 13	Recent Advances in Biomedical Engineering
Week 14	Clinical Engineering
Week 15	Mid Exam.2
Week 16	Review and Final Preparation

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Lectures	Yes
Recommended Texts	INTRODUCTION TO BIOMEDICAL ENGINEERING HUMAN RESOURCES FOR MEDICAL DEVICES The role of biomedical engineers WHO Medical device technical series Ethics in Biomedical Engineering	Yes
Websites	Read: Biomedical Engineering Overview	

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 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	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 الاخرى			
Prerequisite module	Electrical Circuit	**Semester**	1, 2
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. 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 إلرشادية	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 خالل الفصل	123	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	8.2
Unstructured SWL (h/sem) الحمل الدراسي المنتظم للطالب خالل الفصل	27	**Unstructured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	1.8
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**	4	16% (4)	Continuous	LO # 1-15
	Onsite Assignments	1	3% (3)	Continuous	LO # 1-15
	Lab.	1	15% (15)	Continuous	
	Seminar/ Report	1	6% (6)	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	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 السبوعي 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
	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	**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		01/06/2024	**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	**Crimes 0f Defunct Baath party**			**Module Delivery**	
Module Type	**B**			☒ **Theory** ☒ **Lecture** **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	URBRC				
ECTS Credits	2.00				
SWL (hr/sem)	50				
Module Level		2	**Semester of Delivery**		1
Administering Department		Type Dept.Code	**College**	Type College Code	
Module Leader	Assistant teacher: Doaa dheyaa		**e-mail**	Doaa.dheyaa@nahrainuniv.edu.iq	
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		Master
Module Tutor	Name (if available)		e-mail	e-mail	
Peer Reviewer Name		Name	**e-mail**	e-mail	
Scientific Committee Approval Date			**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Crimes 0f Defunct Baath party	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. الدفاع عن كرامة الإنسان 2. المساهمة في تغيير حياة الإنسان إلى الأفضل بشأن: التغيير في القيم والمشاعر - والتغيير في السلوك. 3. تعزيز فكرة الديمقراطية ونبذ أفكار الدكتاتورية.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. فهم الطالب للمادة الدراسية 2. تعريف الطالب بالجرائم التي ارتكبها نظام البعث في العراق 3. الوقوف على بطش هذا النظام بالوثائق والصور و التواريخ
Indicative Contents المحتويات الإرشادية	تعليم الطالب الجامعي كيفية مواجهة الاعلام الزائف مستند على الوقائع التاريخية لما مر به العراق من حكم دكتاتوري .

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	هناك العديد من الاستراتيجيات التي يمكن استخدامها في تدريس جرائم حزب البعث في العراق من ابرزها: 1-المناقشات الجماعية حول مواضيع الدكتاتورية وتأثيرها على حقوق وحريات الافراد من خلال توجيه الطلاب لتبادل وجهات النظر والمناقشة النقدية بشأن المادة, اضافة الى التشجيع على المشاركة الفعالة واحترام وجهات النظر 2- اعداد تقارير من قبل الطلبة بشكل فردي حول جرائم نظام البعث في العراق 3- اعداد تقارير تستند على مصادر منهجية مختلفة من قبل الطلبة بشكل مجموعات حول جرائم نظام البعث في العراق

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	.2.
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Module Evaluation تقييم المادة الدراسية				
	Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**

Formative assessment	**Quizzes**	2	10% (10)	,1113	LO #1,2,and#10,#11
	Lab	-	-		-
	Projects	1	10% (10)	Continuous	All
	Report	1	10%(10)	Continuous	-
Summative assessment	**Midterm Exam**	1hr	10% (10)	8	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	مفهوم الجرائم واقسامها
Week 2	انواع الجرائم
Week 3	القرارات الصادرة من المحكمة
Week 4	الجرائم النفسية
Week 5	اليات الجرائم النفسية
Week 6	اثار الجرائم النفسية
Week 7	اثر سلوكيات النظام البعثي في المجتمع
Week 8	امتحان
Week 9	محاربة علماء الدين والحوزة وقصف دور العبادة
Week 10	الجرائم البيئية، التلوث الحربي والاشعاعي وانفجار الالغام
Week 11	كوز+ سياسة الأرض المحروقة وتجفيف الاهوار وتجريف البساتين
Week 12	تدمير البيئة الزراعية والحيوانية
Week 13	جرائم المقابر الجماعية واحداث المقابر الجماعية المرتكبة من قبل النظام البعثي +كوز
Week 14	التصنيف الزمني لمقابر الابادة الجماعية في العراق
Week 15	عرض مفردات مادة الفصل الاول على الطلبة والخطة الدراسية بغية الالتزام بتنفيذها

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	كتاب جرائم حزب البعث في العراق/وزارة التعليم العالي	نعم

Recommended Texts	المراجع ومواقع الانترنت	نعم
Websites		

Grading Scheme مخطط الدرجات				ثابت بدون تغيير
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
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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**		2	10% (5)			Continuous	LO # 1-15
	Onsite Assignments		2	10% (5)			Continuous	LO # 1-15
	Lab.	Class Work	4	1	4	15%	Continuous	
		Report	4	1	4			
		Final	1	7	7			
	Seminars/ reports		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	**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
	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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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		01/06/2024	**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. 4. Calculate the moment of inertia for a given body and axes.
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. 7. 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 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. 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	6.2
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	Moment of Inertia
Week 2	Moment of Inertia (Parallel-axis theorem for an area)
Week 3	Moment of Inertia (Parallel-axis theorem for an area)
Week 4	Introduction to dynamics + applications of dynamics in biomedical engineering
Week 5	Kinematics of particles: rectilinear motion
Week 6	Plane curvilinear motion
Week 7	Plane curvilinear motion
Week 8	normal and tangential coordinates
Week 9	normal and tangential coordinates
Week 10	Semester Examination 1 + relative motion
Week 11	relative motion
Week 12	relative motion
Week 13	Kinetics of particles: Newton's second law
Week 14	Rectilinear motion
Week 15	Curvilinear motion
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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Principles of public administration			**Module Delivery**	
Module Type	**B**			☒ **Theory** ☒ **Lecture** **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	-				
ECTS Credits	2.00				
SWL (hr/sem)	50				
Module Level		2	**Semester of Delivery**		2
Administering Department		Type Dept.Code	**College**	Type College Code	
Module Leader	Assistant teacher: Doaa dheyaa		**e-mail**	Doaa.dheyaa@nahrainuniv.edu.iq	
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		Master
Module Tutor	Name (if available)		e-mail	e-mail	
Peer Reviewer Name		Name	**e-mail**	e-mail	
Scientific Committee Approval Date			**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Crimes 0f Defunct Baath party	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. فهم معنى الادارة ووظائفها وانواعها 2. معرفة بمبادئ العمل الاداري التي يمكن ممارستها في جميع الوظائف 3. التعرف على مفهوم القيادة ونظرياتها و على مستويات الادارة ودورها
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. فهم الطالب للمادة الدراسية 2. اهمية الادارة في العمل الهندسي وفي كافة العلوم فالإدارة العامل الأساسي لنجاح الشركات والمنظمات أو فشلها فالإدارة هي التي تعطي الحياة للمنظمة وهي المحرك الذي يجعل المنظمة تعمل بكفاءة 3. التعرف على المستويات الادارية واسباب التدرج الوظيفي والفرق بين العمل الاداري والمدير
Indicative Contents المحتويات الإرشادية	التعرف على الادارة *مدارس الادارة وتطورها *استراتيجيات التخطيط واهميته *القائد ودوره في المنظمة * التحول الى الادارة الالكترونية

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	هناك العديد من الاستراتيجيات التي يمكن استخدامها في تدريس مبادئ الادارة العامة من ابرزها: 1-المناقشات الجماعية حول مواضيع مبادئ الادارة العامة 2- محاضرات حضورية للإعطاء المادة بالتفصيل 3- اعداد تقارير تستند على مصادر منهجية مختلفة من قبل الطلبة بشكل مجموعات تخص المنهج

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	.2.
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Module Evaluation تقييم المادة الدراسية				
	Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**

Formative assessment	**Quizzes**	2	10% (10)	,1113	LO #1,2,and#10,#11
	Lab	-	-		-
	Projects	1	10% (10)	Continuous	All
	Report	1	10%(10)	Continuous	-
Summative assessment	**Midterm Exam**	1hr	10% (10)	8	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	عرض مفردات مادة الفصل الاول على الطلبة والخطة الدراسية بغية الالتزام بتنفيذها
Week 2	التعرف على الادارة العامة واهميتها وعناصرها
Week 3	التعرف على انواع الادارة ومستوياتها ومهارتها ومهارة المدير والوظائف المرتبطة بالادارة
Week 4	التطور التاريخي ومدارس الفكر الاداري وادوار المدير
Week 5	الفرق بين الادارة العامة وادارة الاعمال
Week 6	الوظائف الادارية والفرعية في الادارة العامة
Week 7	مفهوم النظام ومكوناته
Week 8	امتحان
Week 9	المركزية واللامركزية للهيكل التنظيمي والاختلاف بينهما
Week 10	التخطيط وانواعة
Week 11	كوز+مفهوم صنع القرار واتخاذة والعوامل المؤثره فيه
Week 12	السلطة والمسؤولية
Week 13	كوز+ نظريات القيادة وانماط السلوك القيادي
Week 14	الفرق بين الاعمال الالكترونية والادارة الالكترونية
Week 15	انواع الشبكات المستخدمة وعناصر الادارة الالكترونية

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	مبادئ الادارة /د.شوقي ناجي جواد - , مبادئ الادارة أحمد الشمري & وآخرون , مبادئ إدارة الأعمال مكتبة العبيكان .مبادئ الادارة الاعمال /د. جميل الشماع	نعم

Recommended Texts	- "BusinessManagement", www.encyclopedia.com, Retrieved 2018-4-8. Edited. 2. ↑ "management	نعم
Websites		

Grading Scheme مخطط الدرجات				ثابت بدون تغيير
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	Histology			**Module Deliver'** **\]=y**	
Module Type	C			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	MDER313				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level	3		**Semester of Delivery**	1	
Administering Department	Type Dept. Code		**College**	CREQ	
Module Leader	Assis. Prof Dr. Eman Ghadhban Khalil		**e-mail**	eman.g.khalil@nahrainuniv.edu.iq	
Module Leader's Acad. Title	Assistant Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Assis. Prof Dr. Eman Ghadhban Khalil		**e-mail**	eman.g.khalil@nahrainuniv.edu.iq	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01/09/2025		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	MDER122	**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	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. 1.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Theoretical lectures ,LAB sessions ,pdf, illustrations , educational videos , discussions for: Cognitive goals:Knowledge and understanding how to diagnose the normal tissue by light microscope. Knowledge & understanding the parts (organs) of body systems. Knowledge & understanding the function of each part ,organ & system. Learn about medical devices needed for diagnosing tissues &organs. To develop the professional medical engineering capabilities& skills students in the field of diagnostic devices & technologies. To understand the Philosophy of histological constructional structure of tissue organs
Indicative Contents المحتويات الإرشادية	**Indicative content includes the following.** Introduction to the cell biology , Epithelial tissue ,. connective tissue, Cartilage& Bone . Muscular tissue Circulatory System Nervous tissue Respiratory System The Digestive System . Urinary System

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Assessment is based on hand-in assignments, written exam, Case study, Quizzes, Reports, 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	4.13
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**	3	18% (18)	Continuous	LO #1-12
	Assignments/ Lab.	2	15% (15)	Continuous	LO # 1-12
	homework	1	2% (2)	15	
	Report	1	5% (5)	13	LO # 1-14
Summative assessment	**Midterm Exam**	2 exam, 1:30 hr each	10% (10)	6	LO # 1-6 ,7-11
	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 the cell biology , Types of tissues; Epithelial tissue ,characteristic features of epithelial cells,
Week 2	Specializations of the apical cell surface ,types of epithelia, glandular epithelia , Cell junction , Connective tissue;Cells of connective tissue,&connective tissue matrix.
Week 3	Types of connective tissue, Cartilage& Bone

Week 4	Muscular tissue; Skeletal muscle ,cardiac muscle, ,& smooth muscle
Week 5	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.
Week 6	The Heart compartments .layers of heart wall:endocardium ,myocardium & epicardium.Card valves.Impulse conducting system.
Week 7	Nervous tissue
Week 8	Mid-term Exam Respiratory System : components in relation to lungs or the function. Respiratory Epithelium. Respiratory portion& conduction portion.
Week 9	Nasal cavities. olfactory epithelium, Nasopharynx .larynx. Trachea , bronchi ,Bronchioles: Terminal bronchio Respiratory bronchioles. Alveolar duct .Alveolar sac& alveoli .Pleural membranes
Week 10	The Digestive System: oral cavity , , pharynx ,general structure of the digestive tract .Esophagus. Stomach.Small Intestine...
Week 11	Large Intestine (colon).Rectum .Pancreas&Liver. &Gall bladder
Week 12	Mid-term Exam
Week 13	Urinary System: renal functions, the kidney, nephrons: types .blood supply of the kidney.
Week 14	Renal corpuscles, the mesangium. proximal&distal convoluted tubules.Juxtaglomerular apparatu,collecting ducts.The excretory passage.Transitional epithelium.The ureters,Urinary bladder & Urethera. Lab final
Week 15	
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: the microscope& Epithelial tissue
Week 2	Connective tissue
Week 3	Cartilage& Bone
Week 4	Muscular tissue
Week 5	Blood cells

Week 6	blood vessels
Week 7	1st lab exam
Week 8	Nervous tissue
Week 9	Respiratory System
Week 10	The Digestive System
Week 11	The Digestive System
Week 12	Urinary System
Week 13	Urinary System
Week 14	final lab exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Junqueira's Basic Histology - Text and Atlas (13th Ed)	
Recommended Texts	-principles of anatomy and physiology 12th ed - g. tortora, b scientific journals related to bone diseases.	
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
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	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	**Materials Science**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MDER211**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	3		**Semester of Delivery**	5	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Alaa Ayyed Al-Taie		**e-mail**	alaa.ayyed@nahrainuniv.edu.iq	
Module Leader's Acad. Title	Dr		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Assist. Lec. Arkan Saad Mohammed Raoof		**e-mail**	arkan.alkzzaz@nahrainuniv.edu.iq	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	1/6/2025		**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	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, 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.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Knowledge of materials: Students gain a comprehensive understanding of different types of materials, including metals, ceramics, polymers, composites, and semiconductors. They learn about their structure, properties, and behavior under various conditions. 2. Material characterization techniques: Students learn to use a range of characterization techniques to analyze materials and determine their properties. 3. Material processing and synthesis: Students acquire knowledge of various techniques used to process and synthesize materials. This includes casting, sintering, powder metallurgy, polymer synthesis, thin film deposition, and additive manufacturing methods like 3D printing. 4. Material properties and behavior: Students develop an understanding of material properties such as mechanical strength, electrical conductivity, thermal conductivity, optical properties, and magnetic behavior. They learn how these properties are influenced by factors such as composition, structure, defects, and processing conditions.

	5. Material selection and design: Students learn to select appropriate materials for specific applications based on their properties, performance requirements, and cost considerations. They develop skills in materials design, where they can tailor the composition, structure, and processing of materials to achieve desired properties and optimize performance. 6. Materials in different applications: Students gain knowledge of materials used in various industries and applications, such as aerospace, automotive, electronics, energy, healthcare, and construction. They understand the unique requirements and challenges associated with each application and learn how to apply materials science principles to address them. 7. Problem-solving and critical thinking: Studying materials science helps students develop problem-solving skills and critical thinking abilities. They learn to analyze and interpret data, identify material-related issues, propose solutions, and evaluate the potential impact of material choices on performance and sustainability. 8. Understanding material performance and failure: Students learn about material failure mechanisms, including fatigue, corrosion, fracture, and wear. They understand how materials degrade under different conditions and gain knowledge of strategies to enhance material performance and prevent failures. 9. Sustainability and environmental considerations: Students develop an awareness of the environmental impact of materials and learn about sustainable materials and processes. They explore ways to reduce energy consumption, optimize resource utilization, and develop environmentally friendly materials.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Introduction of materials, classification of materials: metals, polymers, ceramics, composites [20 hrs] The structure of solids, classify solids, crystal structure, crystal directions, crystalline defects, bonding in solids, Miller indices, linear and planar densities [20 hrs] the iron–iron carbide (Fe–Fe3C) phase diagram, development of microstructure in Iron - carbon alloys [20 hrs] Materials testing, mechanical testing of materials: tensile testing, compression testing, hardness testing [20 hrs] **Exams** Mid term exam [2 hrs]

	Lab final exam[2 hrs] Preparation of exam[19 hrs] Reports [2 hrs] Field visit[20 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Assessment is based on written exam, Quizzes, practical testing,online assignment and onsite assignment and reports.

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) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	4	12% (12)	2,3,5 and 10	LO #1-5 and 8
	Online Assignments	1	4% (4)	8	2,4 and 5
	Onsite Assignments	2	6% (6)	4 and 8	2,4 and 5
	Projects / Lab.	1	15% (15)	Continuous	
	Report	1	3% (3)	13	LO # 3,5,6,8 and 9
Summative assessment	**Midterm Exam**	3 hr	10% (10)	6	LO # 1-9
	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 materials science	Lectu
Week 2	Metallic, polymer, ceramics and composites structures	Lectu
Week 3	Metal Structure and Bonding in Materials	Lectu
Week 4	Metal Structure and Bonding in Materials	Lectu
Week 5	Crystalline Structures	Lectu
Week 6	Mid term exam	Lectu
Week 7	NONCRYSTALLINE SOLIDS and miller indices	Lectu
Week 8	Planar density	Lectu
Week 9	linear density	Lectu
Week 10	Properties of Engineering Materials	Lectu
Week 11	Properties of Engineering Materials	Lectu
Week 12	Mechanical Properties of Engineering Materials	
Week 13	Mechanical Properties of Engineering Materials	
Week 14	HARDNESS	
Week 15	Phase equilibrium diagram	
Week 16	**Preparatory week before the final exam**	

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

Week 1	Lab 1: specimen preparation including grinding
Week 2	Lab 2: specimen preparation including polishing
Week 3	Lab 3: specimen preparation including etching
Week 4	Lab 4: microscopical examination of the specimen
Week 5	Lab 5: specimen molding
Week 6	Lab 6: structural and microscopical examination
Week 7	Lab 7: phase equilibrium diagram including explanation about carbon-steel composition at different temperatures

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Materials Science and Engineering an Introduction	No
Recommended Texts		No
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	**Mechanics of Materials**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MDER310**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	3		**Semester of Delivery**	1 (five)	
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	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 الأخرى			
Prerequisite module	MDER211	**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. To introduce the standards and associated measurements that regulate the use of engineering materials. 3. To introduce the wide range of materials used in engineering and their fundamental, physical properties.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Demonstrate an understanding of the concepts of stress and strain, and the stress-strain relationships for homogenous, isotropic materials. 2. Demonstrate an understanding of the relationships between loads, member forces and deformations and material stresses and strains in structural members under axial loading, torsion, flexural loadings, shear, and thin-walled pressure vessels. 3. Demonstrate an understanding of failure under complex stress states in structural members subjected to combined loadings. 4. Apply the above understanding to the designs and analysis of structural members based on strength and deformation criteria. 5. Demonstrate competence in problem identification, formulation and solution, and critical thinking. 6. Use methods learnt for equilibrium of bodies and the resultant of a generally distributed loading to compute the internal forces in beams. Generalise the procedure to construct bending moments and shear force diagrams (internal forces) and utilise this information in engineering design.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Simple Stress and Strain Compound Bars Beams Bending Moments and Shear Force Diagrams Bending Stresses in Beams
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The module is assessed through a combination of quizzes, 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	48	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	52	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.46
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**	4	20% (20)	3, 5, 10, 14	LO #1, 2, 3 and 6
	Assignments	2	10% (10)	4, 9	LO # 4, 5 and 6
	Projects / Lab.				
	Report	1	10% (10)		
Summative assessment	**Midterm Exam**	3 hr	10% (10)	7	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	Simple Stress and Strain
Week 2	Simple Stress and Strain
Week 3	Compound Bars
Week 4	Compound Bars
Week 5	Compound Bars
Week 6	Compound Bars
Week 7	Beams Bending Moments and Shear Force Diagrams

Week 8	Beams Bending Moments and Shear Force Diagrams
Week 9	Beams Bending Moments and Shear Force Diagrams
Week 10	Beams Bending Moments and Shear Force Diagrams
Week 11	Mid examination
Week 12	Bending Stresses in Beams
Week 13	Bending Stresses in Beams
Week 14	Bending Stresses in Beams
Week 15	Bending Stresses in Beams
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	Mechanics of Materials, Hearn,2nd edition, Perjamon press,1985	Yes
Recommended Texts	Khurmi, R.S. and Gupta, J.K., 2005. A textbook of machine design. S. Chand publishing. Nash, W. and Potter, M., 2011. Schaum's outline of strength of materials. McGraw-Hill Education.	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	**Medical Equipment I**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	**MDER314**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level		Third	**Semester of Delivery**		one
Administering Department		Biomedical Engineering department	**College**	College of engineering	
Module Leader	Name Mais Odai Abdulrassul		**e-mail**	mais.o.abdulrassul@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		18/6/2026	**Version Number**		1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Electronic circuit I & II	**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. Enable students to be able to understand the main functions of Imaging instruments 2. Enable students to identify the importance of these instruments 3. To make students able to handle imaging instruments 4. Enable students to be able to understand the main functions of imaging instruments
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understand the principles and fundamentals of X-ray imaging: Students will develop a comprehensive understanding of the basic principles of X-ray production, interaction with matter, image formation, and radiation safety. 2. Understand the principles and fundamentals of computed tomography (CT) scanning: Students will develop a comprehensive understanding of the basic principles of CT imaging, including X-ray production, data acquisition, image reconstruction, and radiation safety
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Theory X-Ray Equipment: X-ray definition, theory and production, Design of X-ray tube, X-ray power supplies and circuits, Heat loading characteristics of X-ray tube, X-ray control unit, X-ray switches and timing model, Development of X-ray films (automatic and manual), X-ray fluoroscope machine [30 hrs] Computed Tomography (CT scan): Introduction, data-Acquisition geometries, x-ray system of the CT, data acquisition system, computer system, Typical faults and maintenance. [30 hrs] Lab Introduction to X-ray Machine, Anode (Target Material), Cathod (Target Material), Glass envelope, Common Causes of Tube Failure, Care of the X-Ray Tube, Collimator and Grid. [30 hrs] Exams Mid term Exams [2 hrs] Lab Final Exam [4 hrs] Preparation for Exams [20 hrs] Seminars. [4 hrs] Field Visits [5 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	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	57	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.1
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	7% (7)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	7% (7)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	15% (15)	Continuous	
	Report	1	5% (5)	13	LO # 5, 8 and 10
	Seminar	1	6% (6)	14	LO # 3, 4, 6 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	X-Ray Equipment: X-ray definition
Week 2	Theory and production
Week 3	Design of X-ray tube
Week 4	Main X-Ray Circuit

Week 5	Mid-term Exam I
Week 6	X-ray power supplies and circuits
Week 7	Heat loading characteristics of X-ray tube
Week 8	X-ray control unit
Week 9	X-ray switches and timing model
Week 10	Development of X-ray films (automatic and manual)
Week 11	Mid exam II
Week 12	X-ray fluoroscope machine
Week 13	Computed Tomography (CT scan): Introduction
Week 14	data-Acquisition geometries, x-ray system of the CT
Week 15	data acquisition system, computer system, Typical faults and maintenance.
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction to X-ray Machine
Week 2	Lab 2: Anode (Target Material)
Week 3	Lab 3: Cathod (Target Material)
Week 4	Lab 4: Glass envelope
Week 5	Lab 5: Common Causes of Tube Failure
Week 6	Lab 6: Care of the X-Ray Tube
Week 7	Lab 7: Collimator and Grid
Week 8	Lab 8: High Frequency Generator
Week 9	Lab 9: Operating Console
Week 10	Lab 10: X-ray Cassettes & Film
Week 11	Lab 11: X-ray Equipment Room
Week 12	Lab 12: Image Intensifier
Week 13	Lab 13: Beam Restrictive Devices
Week 14	Lab 14: Revision
Week 15	Lab Final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1. The Biomedical Engineering Handbook, By Josef D. Bronzino. 2. Biomedical Technology and Devices Handbook, By James Moore, George Zouridakis.	Yes
Recommended Texts	Medical Imaging Physics, By William R. Hendee, E. Russell Ritenour	No
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	**Physiology I**			**Module Delivery**	
Module Type	**C**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MDER312**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	3		**Semester of Delivery**	5	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Dr. Abbas Fadel Dr. Dunia Tahseen Nema		**e-mail**	dunia.t.nema@nahrainuniv.edu.iq	
Module Leader's Acad. Title	Assistant professor 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	28/01/2026		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Clinical Chemistry (MDER 110)	**Semester**	First
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	Course is designed to learn the student 7 main principles: 1- To Know about Philosophy of physiology in medicine & biomedical engineering. 2- To apply this philosophy in work field. 3- To get a practical skill, and developing professional capabilities of students. 4-To learn how to diagnose some physiological problem. 5- To learn basic concepts of physiological subjects which is related with devices and instrument 6. To know about the body fluids, blood, and its components. 7. To understand the physiology of muscles and nerves
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	The student will be able : 1. To understand the different body fluids, its component and their distribution outside and inside the cell in normal and pathological conditions and how to maintain them in a state of balance. 2. To identify and distinguish red blood cells, their origin and related diseases. 3. To identify and distinguish white blood cells, their origin, types and diseases related to them. 4. To Learn about blood clotting factors ,blood types, methods of transfusion, and matching 5. Learn about the concept of body immunity, how the immune system responds to foreign bodies such as viruses and bacteria, how to deal with them, and the difference between exposure to infection for the first time and the second time, as well as identifying immune bodies, their composition, methods of measurement, and the devices used for this purpose. 6. Identify the physiology of muscles and nerves
Indicative Contents المحتويات الإرشادية	Indicative content includes the following:- 1- Body fluids Compartments, distributions, calculations, osmosis and diffusions, water balance, electrolyte balance. [4 hrs.] 2- Clinical abnormalities of fluid volume regulation (hypo& hyper natremia) + Edema(intra & extra cellular). [4 hrs.] 3- Physiology of blood Definition, functions, compositions, cells (RBC, Hmopoiesis, production, stages of differentiation, genesis, erythropoietin,Hb, anemia, polycythemia) , diapedesis [8 hrs.]

	4- White blood cells (types: nutrophils, monocytes, eosinophils, basophils, lymphocytes), Phagocytosis. [8 hrs.] 5- Blood clotting factors Blood groups and transfusion reaction. [6 hrs.] 6- WBC Immunity [8 hrs.] 7- Muscle & nerve [22 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
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
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**	2/6	12% (12)	4,6,8,10 and 12	LO #1, 2, 3,4 and 5
	Online Assignments	5/1	5% (5)	-	-
	Onsite Assignments	2/2	4% (4)	5,10	LO# 3,4 and 8
	Projects / Lab.	5/3	15% (15)	Continuous	
	Seminar	1/4	4% (4)		

Summative assessment	**Midterm Exam**	3 hr	10% (10)	7	LO # 1-5
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Body fluids Compartments, distributions, calculations, osmosis and diffusions, water balance, electrolyte balance.
Week 2	Clinical abnormalities of fluid volume regulation (hypo& hyper natremia) Edema(intra & extra cellular).
Week 3	Physiology of blood Definition, functions, compositions, cells (RBC, Hmopoiesis, production, stages of differentiation, genesis, erythropoietin,Hb, anemia, polycythemia) , diapedesis
Week 4	Physiology of blood Definition, functions, compositions, cells (RBC, Hmopoiesis, production, stages of differentiation, genesis, erythropoietin,Hb, anemia, polycythemia) , diapedesis
Week 5	White blood cells (types: nutrophils, monocytes, eosinophils, basophils, lymphocytes), Phagocytosis.
Week 6	White blood cells (types: nutrophils, monocytes, eosinophils, basophils, lymphocytes), Phagocytosis.
Week 7	Blood clotting factors
Week 8	Blood groups and transfusion reaction.
Week 9	WBC Immunity I
Week 10	WBC Immunity II
Week 11	Muscle & nerve
Week 12	Muscle & nerve
Week 13	Muscle & nerve
Week 14	Muscle & nerve
Week 15	**Muscle & nerve**

Week 16	**Muscle & nerve**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Safety
Week 2	Lab 2: Osmosis
Week 3	Lab 3: The total RBC count
Week 4	Lab 4: The total WBC count
Week 5	Lab 5: Differential WBC count
Week 6	Lab 6: Estimation of Hb
Week 7	Lab 7: Blood clotting
Week 8	Lab 8: Blood grouping and cross matching
Week 9	Lab 9: Final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Principiles of anatomy and physiology, by Gerard J. Tortora& Bryan H. Derrickson 12PthP ed. Volume 1 2009	Yes
Recommended Texts	Text book of medical physiology, by Guton & Hall . eleven ed. 2020.	No
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	**Mechanics of Materials**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MDER321**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level		3	**Semester of Delivery**		2 (six)
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		Lecturer	**Module Leader's Qualification**		Ph.D.
Module Tutor	Assist. Lec. Arkan Saad Mohammed Raoof		**e-mail**	arkan.saad@nahrainuniv.edu.iq	
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**	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. To introduce the standards and associated measurements that regulate the use of engineering materials. 3. To introduce the wide range of materials used in engineering and their fundamental, physical properties.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Demonstrate an understanding of the concepts of stress and strain, and the stress-strain relationships for homogenous, isotropic materials. 2. Demonstrate an understanding of the relationships between loads, member forces and deformations and material stresses and strains in structural members under axial loading, torsion, flexural loadings, shear, and thin-walled pressure vessels. 3. Demonstrate an understanding of failure under complex stress states in structural members subjected to combined loadings. 4. Apply the above understanding to the designs and analysis of structural members based on strength and deformation criteria. 5. Demonstrate competence in problem identification, formulation and solution, and critical thinking. 6. Use methods learnt for equilibrium of bodies and the resultant of a generally distributed loading to compute the internal forces in beams. Generalise the procedure to construct bending moments and shear force diagrams (internal forces) and utilise this information in engineering design.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Slope and Deflection of Beams Shearing Stresses and Beams Torsion of Circular Shafts
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The module is assessed through a combination of quizzes, 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	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**	4	20% (20)	3, 5, 10, 14	LO #1, 2, 3 and 6
	Assignments	2	5% (5)	4, 9	LO # 4, 5 and 6
	Projects / Lab.	1	15% (10)	Continuous	
	Report				
Summative assessment	**Midterm Exam**	3 hr	10% (10)	7	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	Slope and Deflection of Beams
Week 2	Slope and Deflection of Beams
Week 3	Slope and Deflection of Beams
Week 4	Shearing Stresses and Beams
Week 5	Shearing Stresses and Beams
Week 6	Shearing Stresses and Beams
Week 7	Shearing Stresses and Beams
Week 8	Mid examination

Week 9	Torsion of Circular Shafts
Week 10	Torsion of Circular Shafts
Week 11	Torsion of Circular Shafts
Week 12	Torsion of Circular Shafts
Week 13	Torsion of Circular Shafts
Week 14	Thin Cylinders and Shells
Week 15	Thin Cylinders and Shells
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Simple Tension
Week 2	Lab 2: Simple Compression
Week 3	Lab 3: Shear Test
Week 4	Lab 4: Hardness and Impact
Week 5	Lab 5: Deflection of Beams
Week 6	Lab 6: Curve Beams
Week 7	Lab 7: Unsymmetrical Bending

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Mechanics of Materials, Hearn,2nd edition, Perjamon press,1985	Yes
Recommended Texts	Khurmi, R.S. and Gupta, J.K., 2005. A textbook of machine design. S. Chand publishing. Nash, W. and Potter, M., 2011. Schaum's outline of strength of materials. McGraw-Hill Education.	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	**Mechanics of Materials**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MDER321**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level		3	**Semester of Delivery**		2 (six)
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		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 الأخرى			
Prerequisite module	MDER210	**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. To introduce the standards and associated measurements that regulate the use of engineering materials. 3. To introduce the wide range of materials used in engineering and their fundamental, physical properties.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Demonstrate an understanding of the concepts of stress and strain, and the stress-strain relationships for homogenous, isotropic materials. 2. Demonstrate an understanding of the relationships between loads, member forces and deformations and material stresses and strains in structural members under axial loading, torsion, flexural loadings, shear, and thin-walled pressure vessels. 3. Demonstrate an understanding of failure under complex stress states in structural members subjected to combined loadings. 4. Apply the above understanding to the designs and analysis of structural members based on strength and deformation criteria. 5. Demonstrate competence in problem identification, formulation and solution, and critical thinking. 6. Use methods learnt for equilibrium of bodies and the resultant of a generally distributed loading to compute the internal forces in beams. Generalise the procedure to construct bending moments and shear force diagrams (internal forces) and utilise this information in engineering design.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Slope and Deflection of Beams Shearing Stresses and Beams Torsion of Circular Shafts
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The module is assessed through a combination of quizzes, 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	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**	4	20% (20)	3, 5, 10, 14	LO #1, 2, 3 and 6
	Assignments	2	5% (5)	4, 9	LO # 4, 5 and 6
	Projects / Lab.	1	15% (10)	Continuous	
	Report				
Summative assessment	**Midterm Exam**	3 hr	10% (10)	7	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	Slope and Deflection of Beams
Week 2	Slope and Deflection of Beams
Week 3	Slope and Deflection of Beams
Week 4	Shearing Stresses and Beams
Week 5	Shearing Stresses and Beams
Week 6	Shearing Stresses and Beams
Week 7	Shearing Stresses and Beams
Week 8	Mid examination

Week 9	Torsion of Circular Shafts
Week 10	Torsion of Circular Shafts
Week 11	Torsion of Circular Shafts
Week 12	Torsion of Circular Shafts
Week 13	Torsion of Circular Shafts
Week 14	Thin Cylinders and Shells
Week 15	Thin Cylinders and Shells
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Simple Tension
Week 2	Lab 2: Simple Compression
Week 3	Lab 3: Shear Test
Week 4	Lab 4: Hardness and Impact
Week 5	Lab 5: Deflection of Beams
Week 6	Lab 6: Curve Beams
Week 7	Lab 7: Unsymmetrical Bending

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Mechanics of Materials, Hearn,2nd edition, Perjamon press,1985	Yes
Recommended Texts	Khurmi, R.S. and Gupta, J.K., 2005. A textbook of machine design. S. Chand publishing. Nash, W. and Potter, M., 2011. Schaum's outline of strength of materials. McGraw-Hill Education.	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	**Medical Equipment II**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	**MDER324**				
ECTS Credits	**7**				
SWL (hr/sem)	**175**				
Module Level		Third	**Semester of Delivery**		two
Administering Department		Biomedical Engineering department	**College**	College of engineering	
Module Leader	Name Mais Odai Abdulrassul		**e-mail**	mais.o.abdulrassul@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		18/6/2026	**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Electronic circuit I & II	**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. 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 in manipulating medical image in both NMI and MRI.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understand the principles and fundamentals of MRI: Students will develop a comprehensive understanding of the basic principles of magnetic resonance imaging, including magnetic fields, nuclear magnetic resonance, signal generation, image formation, and safety considerations. 2. Understand the principles and fundamentals of nuclear medicine imaging: Students will develop a comprehensive understanding of the basic principles of nuclear medicine, including radiopharmaceuticals, radioactive decay, gamma radiation detection, image formation, and radiation safety. 3. Identify and operate different types of nuclear medicine imaging equipment: Students will be able to identify and differentiate between various types of nuclear medicine imaging systems, including gamma cameras, SPECT (Single-Photon Emission Computed Tomography) scanners, and PET (Positron Emission Tomography) scanners, and demonstrate proficiency in their operation, including patient preparation, image acquisition, and quality control.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A -MRI the hardware, magnet types, RF coils, magnetization, Radioisotopes in Medical Diagnosis, Physics of Radioactivity, Principles of NMR Imaging System, Image Reconstruction Techniques, Basic MRI Components, Biological Effects of NMR Imaging, Gamma Camera. [30 hrs] Part B – Nuclear Medicine Principles of NMI, Physics of radioactivity, Radioisotopes used in Medicine and Manufacturing, Gamma-ray Detector and Instruments in (NMI), Hardware Components of an NMI, ECT , SPECT and PET. [30 hrs]

	Lab Introduction to MRI hardware, Nuclear Medicine imaging. [30 hrs] Exams Mid term Exams [2 hrs] Lab Final Exam [4 hrs] Preparation for Exams [20 hrs] Seminars. [4 hrs] Field Visits [5 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	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	82	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.1
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	7% (7)	3, 5, 10	LO #1, 2, 10 and 11
	Assignments	3	7% (7)	2,4, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	15% (15)	Continuous	
	Report	1	5% (10)	13	LO # 5, 8 and 10
	Seminar	1	6% (7)	14	LO # 5, 8 and 10
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	MRI- the hardware
Week 2	magnet types
Week 3	RF coils
Week 4	magnetization
Week 5	Principles of NMR Imaging System
Week 6	Mid-term Exam I
Week 7	Image Reconstruction Techniques
Week 8	Basic MRI Components
Week 9	Biological Effects of NMR Imaging
Week 10	Nuclear Medicine- Principles of NMI
Week 11	Mid-term Exam II
Week 12	Physics of Radioactivity
Week 13	Radioisotopes used in Medicine
Week 14	Gamma Camera, Detector and Instruments in (NMI)
Week 15	Hardware Components of an NMI, ECT, SPECT and PET
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction to MRI- the hardware
Week 2	Lab 2: RF coils
Week 3	Lab 3: Basic MRI Components
Week 4	Lab 4: Types of Magnets
Week 5	Lab 5: Nuclear Medicine Imaging
Week 6	Lab 6: Detectors and Instruments in (NMI)
Week 7	Lab7: Hardware Components of an NMI
Week 8	Lab 8: Gamma Camera
Week 9	Lab 9: PET

Week 10	Lab 10: ECT
Week 11	Lab 11: SPECT
Week 12	Lab 12: Seminars
Week 13	Lab 13: Seminars
Week 14	Lab 14: Lab Revision
Week 15	Lab 15: Lab Final Exam

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	1. The Biomedical Engineering Handbook, By Josef D. Bronzino. 2. Biomedical Technology and Devices Handbook, By James Moore, George Zouridakis.	Yes
Recommended Texts	Medical Imaging Physics, By William R. Hendee, E. Russell Ritenour	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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Physiology II**			**Module Delivery**	
Module Type	**C**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MDER323**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	3		**Semester of Delivery**	6	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Dr. Abbas Fadel Dr. Dunia Tahseen Nema		**e-mail**	dunia.t.nema@nahrainuniv.edu.iq	
Module Leader's Acad. Title	Assistant professor 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	28/01/2026		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Medical Chemistry (MDER 110) & Physiology I (MDER312)	**Semester**	First & Fifth
Co-requisites module	None	**Semester**	
Module Aims, Learning Outcomes and Indicative Contents			

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	Course is designed to learn the student 7 main principles: 1- To get a practical skill, and developing professional capabilities of students. 2-To learn how to diagnose some physiological problem. 3- To learn basic concepts of physiological subjects which is related with devices and instrument. 4. To understand physiology of blood (part 2) 5. To know about physiology of some organ like kidneys. 6. To learn about acidity and alkalinity of blood. 7. To understand the physiology of hormones. 8. To understand the physiology of Circulatory system.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	The student will be able : 1. Understands other experiences and terms about blood. 2. To understand how do the kidneys work in maintaining body fluids, electrolytes and other important biological materials, and identifying the functional unit in the kidneys, as well as identifying kidney diseases (acute and chronic) and the five stages. 3. To Identifying the acidity and alkalinity of the blood and how to distinguish pathological conditions as being due to a defect in metabolism or a defect in the respiratory system. 4. To Learn about the endocrine glands and how they work through the three axes (the hypothalamic gland, the pituitary gland, and the target cell), and the meaning of positive and negative feedback, as well as identifying normal and pathological conditions. 5. Learn in detail about blood circulation and heart physiology, and how to perform and read an ECG, and heart-related conditions.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following:- 1- Blood (part 2) [6 hrs.] 2- Kidney (Physiology and functions, nephron, GFR. [6 hrs.] 3- Acid – base balance in human body. [8 hrs.] 4- Physiology of hormones Definition, functions, compositions [6 hrs.]

	5- PHYSIOLOGY OF Circulatory system, The Heart, Systemic and pulmonary circulation, Cardiac muscle action potential, Conductive system, Excitation and Conduction , Cardiac cycle, Pacemaker potential, Contraction of cardiac muscle, Cardiac output, Measurement of cardiac output The effect of heart rate on cardiac output contractility, End diastolic volume Stroke volume, Venous return, regulation of cardiac output, Principle of ECG ECG waves, Limb leads , Chest leads , Cardiac axis [49 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	5
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**	2/6	12% (12)	4,6,8,10 and 12	LO #1, 2, 3,4 and 5
	Online Assignments	5/1	5% (5)	-	-
	Onsite Assignments	2/2	4% (4)	5,10	LO# 3,4 and 8
	Projects / Lab.	5/3	15% (15)	Continuous	
	Seminar	1/4	4% (4)		
	Midterm Exam	3 hr	10% (10)	7	LO # 1-5

Summative assessment	**Final Exam**	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Blood part 2 , Immunity
Week 2	Kidney (Physiology and functions) , (nephron, GFR).
Week 3	Acid – base balance in human body. (Part 1)
Week 4	Acid – base balance in human body. (Part 2)
Week 5	Physiology of hormones (Definition, functions, compositions) (Part 1)
Week 6	Physiology of hormones (Part 2)
Week 7	PHYSIOLOGY OF Circulatory system. The Heart
Week 8	Systemic and pulmonary circulation
Week 9	Cardiac muscle action potential
Week 10	Conductive system, Excitation and Conduction
Week 11	Cardiac cycle, Pacemaker potential
Week 12	Contraction of cardiac muscle, Cardiac output, Measurement of cardiac output
Week 13	The effect of heart rate on cardiac output contractility
Week 14	End diastolic volume Stroke volume, Venous return, regulation of cardiac output
Week 15	Principle of ECG ECG waves, Limb leads , Chest leads , Cardiac axis
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: The capillary resistance test
Week 2	Lab 2: The bleeding time
Week 3	Lab 3: The coagulation time

Week 4	Lab 4: hormonal measurement
Week 5	Lab 5: ECG
Week 6	Lab 6: Blood pressure measurement
Week 7	Lab 7: Respiratory function

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Principiles of anatomy and physiology, by Gerard J. Tortora& Bryan H. Derrickson 12PthP ed. Volume 1 2009	Yes
Recommended Texts	Text book of medical physiology, by Guton & Hall . eleven ed. 2020.	No
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	**Integrated Electronics**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MDER322**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	3		**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	01/06/2025		**Version Number**	1.0	

Module description

This module provides a comprehensive study of **Integrated Electronics**, focusing on the analysis and design of electronic circuits and their practical applications. The course covers **oscillators**, including sinusoidal oscillators and frequency response shaping techniques, as well as **large-signal (power) amplifiers** and their classifications such as Class A, Class B, Class AB, and Class C amplifiers.

The module also introduces **multivibrators** using transistor and operational amplifier configurations, emphasizing stable and monostable circuit designs. In addition, fundamental concepts of **electromagnetic fields** are presented, including electrostatic and magnetic fields, magnetic circuits, flux, permeability, B–H characteristics, and electromagnets.

Special attention is given to the **biomedical application of electromagnetic fields**, particularly **Magnetic Resonance Imaging (MRI)**, to demonstrate the relevance of integrated electronics in modern medical systems. The module develops students' analytical, design, and problem-solving skills, preparing them for advanced studies and practical applications in electronics and biomedical engineering.

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	**Integrated Electronics**	**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 introduce the fundamental principles of **oscillators**, frequency response, and frequency-selective circuits used for generating sinusoidal signals. 2. To provide an understanding of **power amplifiers**, their classification, operating principles, and practical coupling methods. 3. To develop knowledge of **multivibrator circuits** used for waveform generation and timing applications using transistors and operational amplifiers. 4. To provide a foundation in **electromagnetic field theory** and magnetic circuits, with emphasis on **biomedical applications** such as MRI.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Explain frequency response and its role in oscillators 2. Analyze and design sinusoidal oscillator circuits 3. Describe Wien Bridge, Phase Shift, Hartley, and Crystal oscillators 4. Explain shaping of frequency response for frequency selection 5. Distinguish between small-signal and large-signal amplifiers 6. Classify power amplifiers based on conduction angle 7. Explain Class A, B, AB, and C power amplifiers 8. Analyze efficiency, distortion, and power handling 9. Explain the operation of multivibrator circuits 10. Differentiate between astable and monostable multivibrators 11. Design multivibrators using transistors and op-amps 12. Explain electrostatic and magnetic field concepts 13. Define electric field strength and flux density 14. Analyze magnetic circuits and B–H characteristics 15. Explain the working principle of MRI
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1 — 3 h — Introduction to oscillators, frequency response of electronic circuits 2 — 3 h — Sinusoidal oscillators and Barkhausen criterion 3 — 3 h — Wien Bridge oscillator: principle, circuit, and applications 4 — 3 h — Phase shift oscillator, shaping of frequency response, Hartley oscillator, crystal oscillator 5 — 3 h — Introduction to large signal and power amplifiers 6 — 3 h — Theory of power amplifier classification, conduction angle 7 — 3 h — Class A and Class B power amplifiers 8 — 3 h — Class AB and Class C power amplifiers, properties and efficiency 9 — 3 h — Transformer-coupled amplifiers, direct-coupled stages,

	Class B push-pull amplifier 10 3 h Introduction to multivibrators, astable multivibrator using transistor 11 3 h Monostable multivibrator using transistor, design considerations 12 3 h Astable and monostable multivibrators using opamps 13 3 h Electrostatic field, electric field strength and electric flux density 14 3 h Magnetic fields, magnetic circuits, magnetic flux and flux density 15 3 h Magnetomotive force, permeability, B–H curves, reluctance, electromagnets, MRI application

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	• Enhance conceptual understanding • Develop analytical and design skills • Encourage active learning and problem-solving • Connect theory with practical and biomedical applications

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	5.1
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	Theory	Quizzes	2	12% (6)	Continuous	LO #1-15
		Onsite assignments	1	4% (4)	Continuous	Continuous
		assignments Homework	2	6% (3)	Continuous	LO # 1-15
		Report	1	3% (3)	Continuous	LO # 1-15
	Lab	Experimental Quizzes	2	10% (5)	Continuous	LO # 1-15
		Experimental reports	5	5% (1)	Continuous	LO # 1-15
Summative assessment	Midterm Exam		1	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 to oscillators, frequency response of electronic integrated circuits
Week 2	Theory of Sinusoidal oscillators and Barkhausen criterion and Wien Bridge oscillator: principle, circuit, Phase shift oscillator
Week 3	Theory of shaping of frequency response, Hartley oscillator, crystal oscillator
Week 4	Introduction to large signal and power amplifiers, Theory of power amplifier classification, conduction angle
Week 5	Theory of Class A and Class B power amplifiers
Week 6	Theory of Class AB and Class C power amplifiers, properties and efficiency
Week 7	Mid exam

Week 8	Theory of Class AB and Class C power amplifiers, properties and efficiency.
Week 9	Theory of Transformer-coupled amplifiers, direct-coupled stages, Class B push-pull amplifier
Week 10	Introduction to multivibrators, Astable multivibrator using transistor
Week 11	Theory of Monostable multivibrator using transistor, design considerations
Week 12	Theory of Astable and monostable multivibrators using op-amps
Week 13	Theory of Electrostatic field, electric field strength and electric flux density
Week 14	Theory of Magnetic fields, magnetic circuits, magnetic flux and flux density
Week 15	Theory of Magnetomotive force, permeability, B–H curves, reluctance, electromagnets, MRI application
Week 16	**Final exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Sinusoidal oscillators and Wien Bridge oscillator
Week 2	Lab 2: Sinusoidal oscillators and RC-Phase shift oscillator,
Week 3	Lab 3: Hartley oscillator
Week 4	Lab 4: power amplifiers Class A
Week 5	Lab 5: power amplifiers Class AB , and Class B power amplifiers
Week 6	Lab 6: Astable multivibrators using op-amps
Week 7	Lab 7: monostable multivibrators using op-amps

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	John Bird, Electrical and Electronic Principles and Technology, Routledge (latest edition). Boylestad, R. L., Electronic Devices and Circuit Theory, Pearson Education.	
Recommended Texts	Sedra, A. S., and Smith, K. C., Microelectronic Circuits, Oxford University Press. Malvino, A. P., and Bates, D. J., Electronic Principles,	

	McGraw-Hill. Hayt, W. H., Buck, J. A., Engineering Electromagnetics, McGraw-Hill. Floyd, T. L., Electronic Devices, Pearson Education.	
Websites	All About Circuits – educational articles and tutorials on electronics Electronics Tutorials – explanations of amplifiers, oscillators, and wave shaping	

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	**Computational engineering methods**			**Module Delivery**	
Module Type	**Support or related learning activity**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MDER320**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	3		**Semester of Delivery**	2	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Reem Shaker		**e-mail**	Reem.sh.mahmood@nahrainuniv.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	PhD	
Module Tutor	-		**e-mail**	E-mail	
Peer Reviewer Name	-		**e-mail**	E-mail	
Scientific Committee Approval Date			**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 understanding of numerical methods. 2. Enhance problem-solving skills. 3. Improve computational and programming abilities. 4. Foster critical thinking and analysis. 5. Apply numerical techniques to real-world problems.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understand fundamental numerical methods used in engineering. 2. Analyze and quantify errors associated with numerical methods. 3. Learn techniques for function approximation and data interpolation. 4. Understand numerical methods for approximating definite integrals. 5. Learn numerical methods for solving ordinary and partial differential equations. 6. Apply numerical analysis techniques to model and simulate engineering systems. 7. Develop programming skills and proficiency in numerical analysis software. 8. Analyze and visualize numerical data using appropriate methods and tools.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. ● Basics of Numerical Analysis .[2 hrs] ● Numerical Methods for Solving Systems of Nonlinear Equations. [16 hrs] ○ The Bisection Method. ○ False Position Method. ○ Newton's methods. ○ Secant Methods. ○ Simple Fixed-Point Iteration Methods. ● Interpolation and Polynomial Approximation. [4 hrs] ● Numerical Integration & Differentiation. [4 hrs] ● Exames .[4 hrs] ● Laboratory [30 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)	63	**Structured SWL (h/w)**	4

الحمل الدراسي المنتظم للطالب خلال الفصل		الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.5
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	Theory	**Quizzes**	2	5% (10)	Continuous	LO #1-15
		Onsite assignments	5	1% (5)	Continuous	LO #1-15
		Homework	5	1% (5)	Continuous	LO # 1-15
		Report	1	5% (5)	Continuous	LO # 1-15
	Lab		3	5% (15)	Continuous	LO #1-15
Summative assessment	**Midterm Exam**		1	10% (10)	Continuous	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 - Basics of Numerical Analysis
Week 2	Numerical Methods for Solving Systems of Nonlinear Equations /The Bisection Method
Week 3	Numerical Methods for Solving Systems of Nonlinear Equations / False Position Method
Week 4	Numerical Methods for Solving Systems of Nonlinear Equations / Newton's methods
Week 5	Numerical Methods for Solving Systems of Nonlinear Equations / Secant Methods
Week 6	Numerical Methods for Solving Systems of Nonlinear Equations / Simple Fixed-Point Iteration Methods
Week 7	1st mid exam
Week 8	Interpolation and Polynomial Approximation
Week 9	Interpolation and Polynomial Approximation

Week 10	Numerical Integration
Week 11	Numerical Integration
Week 12	Numerical Differentiation
Week 13	Numerical Differentiation
Week 14	2nd mid exam
Week 15	**Preparatory week before the final Exam**
Week 16	**Final exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: INTRODUCTION TO MATLAB
Week 2	Lab 2: ROOT FINDING METHODS USING BISECTION METHOD WITH MATLAB
Week 3	Lab 3: ROOT FINDING METHODS USING FALSE POSITION METHOD WITH MATLAB
Week 4	Lab 4: ROOT FINDING METHODS USING BISECTION METHOD WITH EXCEL
Week 5	Lab 5: ROOT FINDING METHODS USING FALSE POSITION METHOD WITH EXCEL
Week 6	Lab 6: ROOT FINDING METHODS USING NEWTON-RAPHSON METHOD WITH MATLAB
Week 7	Lab 7: ROOT FINDING METHODS USING SECANT METHOD WITH MATLAB
Week 8	Lab 8: ROOT FINDING METHODS USING NEWTON-RAPHSON METHOD WITH EXCEL
Week 9	Lab 9: ROOT FINDING METHODS USING SECANT METHOD WITH EXCEL

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Lectures	Yes
Recommended Texts	• Numerical Analysis, Richard L. Burden. • An Introduction to Numerical Analysis, Atkinson.	No
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	**PATHOLOGY**			**Module Delivery**	
Module Type	**C**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐**Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	MDER 415				
ECTS Credits	**5**				
SWL (hr/sem)	30 hours\2units				
Module Level		4	**Semester of Delivery**		7
Administering Department		Type Dept. Code	**College**	Type College Code	
Module Leader	Assis. Prof. Dr. Eman Ghadhban Khalil		**e-mail**	Eman.g.khalil@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		01/09/2025	**Version Number**		

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	MDER313,MDER323	**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 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.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	The student will be 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 new techniques to help in diagnosing diseases. 8\.Analyzing, discussing, and using information to design and evaluation medical devices 9\ Learn to adhere to the ethical principles of the profession and society.
Indicative Contents المحتويات الإرشادية	**Catalog Description: This course will provide students with a detailed knowledge of cardiovascular physiology, pathology, and haemodynamics in addition to the respiratory system components & diseases . So it is introduce students to the parts of the circulatory and respiratory systems, their functions, and the diseases that affect these systems, thus increasing the student's knowledge of this subject. It also introduces them to technologies and equipment hat can be useful in diagnosing and treating diseases.**

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

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	4%	4,6,12	11
	Onsite Assignment	1	3%	1-11	1-11
	Seminars	1	3%	14-15	1-14
	report				
Summative assessment	**Midterm Exam**	1h	30	9	1-8
	Final Exam	3hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction : cell, tissue , organs,& organ system..
Week 2	development of cell Biology .Pathology, Etiology & Pathogenesis.
Week 3	The Biopsy. Tissue processing, fixation& types
Week 4	Diagnostic techniques in pathology, Cytology,smear preparation.Karyotyping.
Week 5	Frozen sections ,electron microscopy ,Flocytometer, Immunoflorescence, Immunohistochemistry &Polymerase chain Reaction.
Week 6	. Cell injury ,Necrosis .Radiation& cell damage . Inflammation,Acute Inflammation types ,changes&sequels
Week 7	Chronic inflammation. , ulceration , the sinus ,fistula ,cellulitis. Systemic effects of inflammation
Week 8	Repair in chronic inflammation. Wound Healing &Repair.Hemodynamic disorders, Hemostasis, Thrombosis, Embolism

Week 9	Mid exam
Week 10	Infarction,Edema ,Hyperemia &Congestion.Arterial diseases,Atheroma ,Aneurysms.
Week 11	Heart& cardiac function .Heart failure ,Ischaemic heart disease,Acute heart failure &Chronic heart failure. Coronary artery disease,Myocardial infarction
Week 12	Angina Pectoris .Valvular heart Disease. Respiratory system disorders;Inflammation of upper respiratory tract;Acute inflammation
Week 13	Chronic inflammation .Acute& Chronic Bronchitis ,Emphysema , Pneumonia, , Broncho-pneumonia ,Lobar-pneumonia
Week 14	Tuberculosis. & Neoplasia, Seminars
Week 15	Seminars
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	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 5- principles of anatomy and physiology 12th ed tortora, b	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	**Biomechanics I**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☒ **Practical** ☒ **Seminar**	
Module Code	**MDER410**				
ECTS Credits	**6**				
SWL (hr/sem)	**75**				
Module Level		UGIV	**Semester of Delivery**		Seven
Administering Department		Type Dept. Code	**College**	Type College Code	
Module Leader	Dr Sadiq Jafar Hamandi		**e-mail**	sadiq.j.abbas@nahrainuniv.edu.iq	
Module Leader's Acad. Title		Ass. 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		01/06/2020	**Version Number**		1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	MDER211	**Semester**	Three
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. Describe the scope of scientific inquiry addressed by biomechanists 2. 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. 3. Describe the processes involved in the biomechanics of human bone growth and development, human skeletal articulations, and human skeletal muscle 4. 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. 5. The ability to practically apply the underpinning theoretical concepts to design experiments and analyze experimental data related to physical activity
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Clearly distinguish between the biomechanics of human tissues: bones, articulations, and muscles. 2. Think critically about the biomechanics of the human upper extremity, human lower extremity, and spine. 3. Identify factors influencing the relative mobility and stability of upper-extremity, lower extremity, and spine. 4. Explain the ways in which the lower extremity is adapted to its weight-bearing function. 5. Describe the biomechanical contributions to common injuries of the upper extremity, lower extremity, and spine
Indicative Contents المحتويات الإرشادية	What Is Biomechanics? (6 Hours) Kinematic Concepts for Analyzing Human Motion (6 Hours) Kinetic Concepts for Analyzing Human Motion (6 Hours) The Biomechanics of Human Bone Growth and Development (8 Hours) The Biomechanics of Human Skeletal Articulations (8 Hours) The Biomechanics of Human Skeletal Muscle (8 Hours) The Biomechanics of the Human Upper Extremity (6 Hours) The Biomechanics of the Human Lower Extremity (6 Hours) The Biomechanics of the Human Spine (6 Hours)

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	87	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.8
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 3
	Assignments	2	10% (10)	2, 12	LO # 4, and 5
	Projects / Lab.	1	10% (10)	Continuous	
	Report	1	10% (10)	13	LO # 3, 4 and 5
Summative assessment	**Midterm Exam**	3 hr	10% (10)	7	LO # 1-5
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	What Is Biomechanics?
Week 2	Kinematic Concepts for Analyzing Human Motion
Week 3	Kinetic Concepts for Analyzing Human Motion
Week 4	The Biomechanics of Human Bone Growth and Development
Week 5	The Biomechanics of Human Skeletal Articulations

Week 6	The Biomechanics of Human Skeletal Muscle
Week 7	The Biomechanics of Human Skeletal Muscle
Week 8	Midterm Exam 1
Week 9	The Biomechanics of the Human Upper Extremity
Week 10	The Biomechanics of the Human Upper Extremity
Week 11	The Biomechanics of the Human Lower Extremity
Week 12	The Biomechanics of the Human Lower Extremity
Week 13	The Biomechanics of the Human Spine
Week 14	The Biomechanics of the Human Spine
Week 15	Midterm Exam 2
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Treadmill
Week 2	Videotape
Week 3	Cinematography
Week 4	Videography
Week 5	Goniometer (mechanical)
Week 6	Electro Goniometer
Week 7	Electro Goniometer
Week 8	Leighton flexometer
Week 9	Photocells, light beams, timers

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Basic biomechanics, Susan Jean Hall	Yes
Recommended Texts	Fundamental Concepts of Biomechanics Basic Biomechanics of the Musculoskeletal System	No
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	**Digital Electronics I**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MDER413**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level		UGIV	**Semester of Delivery**		Seven
Administering Department			**College**		
Module Leader	Ahmed Lateef Khudaraham		**e-mail**	ahmed.lateef771@nahrainuniv.edu.iq	
Module Leader's Acad. Title		Assistant Lecturer	**Module Leader's Qualification**		M.Sc.
Module Tutor	Ahmed Lateef Khudaraham		**e-mail**	ahmed.lateef771@nahrainuniv.edu.iq	
Peer Reviewer Name		Name	**e-mail**	E-mail	
Scientific Committee Approval Date		01/06/2025	**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 develop problem solving skills and understanding of digital theory and techniques 2. To understand numbering systems, digital gates, Boolean Algebra, and combinational logic circuits. 3. This course deals with the basic concept of logic and digital electronic. 4. To learn the Boolean expression reduction using Karnaugh map. 5. To understand basic arithmetic circuit as well as combinational circuits such as half and full adder, half and full subtractor, decoder, encoder, multiplexer, demultiplexer.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	At the end of the course students will be able to: 1. Use number systems and complements 2. Identify the importance of canonical forms in the minimization or other optimization of 3. Boolean formulas in general and digital circuits. 4. Minimize functions using any type of minimizing algorithms (Boolean algebra, Karnaugh map or Tabulation method). 5. Analyze the design procedures of Sequential circuits
Indicative Contents المحتويات الإرشادية	UNIT – I [30 hrs] **DIGITAL SYSTEMS AND BINARY NUMBERS:** Digital systems, binary numbers, number base conversions, octal and hexadecimal numbers, complements, signed binary numbers, binary codes, error detection and error correction codes. **BOOLEAN ALGEBRA AND LOGIC GATES:** Basic definitions, axiomatic definition of Boolean algebra, basic theorems and properties of Boolean algebra, Boolean functions, canonical and standard forms, other logic operations, digital logic gates. UNIT – II [30 hrs] **GATE LEVEL MINIMIZATION:** The k-map method, four-variable map, five-variable map, product of sums simplification, don't-care conditions, NAND and NOR implementation, determination and selection of Prime Implicants, Essential and Non essential prime Implicants. UNIT – III [30 hrs] **COMBINATIONAL CIRCUITS:** Design procedure, Binary Adder, Binary Subtractor, Binary Multiplier,

	Magnitude Comparator, Decoders, Encoders, Multiplexers, and Demultiplexers.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Assessment is based on hand-in assignments, written exam, Quizzes, Lab 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	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% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	15% (15)	Continuous	
Summative assessment	**Midterm Exam**	3 hr	15% (15)	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 Digital Electronics
Week 2	Numbers Systems and Conversions
Week 3	Binary Arithmetic : Addition, Subtraction, Multiplication, and Division
Week 4	Signed Numbers and Hexadecimal Arithmetic
Week 5	Logic Gates
Week 6	Boolean Algebra_Laws_Rules_Truth Tables_Simplification : SOP and POS
Week 7	Standard Forms of Boolean Expressions
Week 8	Midterm Exam
Week 9	The Karnaugh Maps
Week 10	Binary Coded Decimal BCD and Digital Codes
Week 11	Code Converters
Week 12	Functions of Combinational Logic_Part1 : Adders and Subtractors (half and full)
Week 13	Functions of Combinational Logic_Part2 : Comparators
Week 14	Functions of Combinational Logic_Part3 : Decoders and Encoders
Week 15	Functions of Combinational Logic_Part4 : Multiplexers and Demultiplexers
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Logic Gates
Week 2	Combinational Logic Circuits
Week 3	Karnaugh Maps
Week 4	Code Conversion
Week 5	Arithmetic Operations : Adders and Subtractors
Week 6	Comparators

Learning and Teaching Resources

مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Introductory Circuit Analysis by Robert Boylestad	Yes
Recommended Texts	Digital Logic Design: Learn the Logic Circuits and Logic Design (English Edition) by Sonali Singh	No
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	Analytical Mechanics			**Module Delivery**	
Module Type	Basic			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MDER220**				
ECTS Credits	**3**				
SWL (hr/sem)	**75**				
Module Level	4		**Semester of Delivery**	8	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Dr. Safa Layth Kailan		**e-mail**	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	15/06/2026		**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 introduce the fundamental principles of analytical mechanics and mechanical vibrations. 2. To develop an understanding of dynamic systems encountered in engineering and biological applications. 3. To relate vibration analysis techniques to the mechanical behavior of the human body and biomedical devices. 4. To provide students with the ability to model, analyze, and interpret vibration phenomena in biological tissues, organs, and medical equipment.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon successful completion of this module, students will be able to: 1. Explain the basic concepts of analytical mechanics and vibration theory. 2. Formulate mathematical models of single and multi-degree-of-freedom vibrating systems. 3. Analyze free and forced vibrations in engineering and biomedical systems. 4. Apply analytical methods to investigate vibration responses in the human musculoskeletal system. 5. Evaluate the effects of mechanical vibrations on human health and physiological functions. 6. Use vibration analysis principles in the design and assessment of biomedical instruments and prosthetic devices. 7. Interpret experimental vibration data and relate it to real-world biomedical applications.
Indicative Contents المحتويات الإرشادية	**Indicative content includes the following.** Introduction to analytical mechanics. Kinematics and dynamics of mechanical systems. Energy methods and generalized coordinates. Fundamentals of mechanical vibrations. Single-degree-of-freedom (SDOF) systems. Free and damped vibrations. Forced vibrations and resonance. Multi-degree-of-freedom (MDOF) systems. Biomechanics of human motion. Vibration characteristics of bones, muscles, and soft tissues. Applications of vibration analysis in biomedical engineering. Vibration considerations in prosthetics, orthotics, and medical devices. Case studies of vibration-related biomedical problems.

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	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	42	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.8
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	10% (10)	Continuous	LO #1, 2, 6 and 7
	Assessment	2	10% (10)	Continuous	
	Seminar	1	10% (10)	13	
	Report	1	10% (10)	13	
Summative assessment	**Midterm Exam**	3 hr	10% (10)	14	LO # 1-7
	Final Exam	3hr	50% (50)	15	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1,2	Introduction to Analytical Mechanics, Kinematics, and Biomedical Applications
Week 3,4	Newtonian Dynamics, Work, Energy, and Conservation Principles
Week 5,6	Introduction to Mechanical Vibrations and Single Degree of Freedom (SDOF) Systems
Week 7	Damped Vibrations
Week 8	First Mid Exam
Week 9,10	Forced Vibrations, Resonance, and Vibration Isolation

Week 11,12	Multi-Degree of Freedom (MDOF) Systems and Vibration Analysis
Week 13	Biomechanical Vibrations of the Human Body and Biomedical Engineering Applications
Week 14	Second Mid Exam
Week 15	Final Review and Preparation for Final Examination

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Analytical Mechanics Textbook Vibration Mechanics Theory of Vibration	Yes
Recommended Texts	Mechanical Vibration, Rao, S. S.	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.

MODULE DESCRIPTION FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**IMAGE PROCESING**			**Module Delivery**	
Module Type	**Core learning activity**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MDER414**				
ECTS Credits	**4**				
SWL (hr/sem)	100				
Module Level			**Semester of Delivery**	2	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Reem Shakir Mahmood		**e-mail**	Reem.sh.mahmood@nahrainuniv.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	Ph.D	
Module Tutor	-		**e-mail**		
Peer Reviewer Name	-		**e-mail**		
Scientific Committee Approval Date			**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	Provide students with a foundational understanding of digital image analysis principles and techniques including image representation, enhancement, segmentation and feature extraction to analyze and interpret digital images.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understand digital image fundamentals and image acquisition. 2. Recognize image types and pixel relationships. 3. Apply histogram processing and mathematical tools. 4. Perform intensity transformation techniques. 5. Apply spatial and frequency domain enhancement methods. 6. Use image analysis software and solve image processing problems. 7. Understand color image processing.
Indicative Contents المحتويات الإرشادية	1. Introduction to Digital Image Processing 2. Image Sampling and Quantization 3. Pixel Relationships 4. Histogram Processing 5. Intensity Transformations 6. Spatial Filtering 7. Frequency Domain Processing 8. Low-pass and High-pass Filters 9. Color Image Processing

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 C++ programming. 2. **Lab Sessions:** Hands-on practice with programming exercises to apply what's learned in lectures. 3. **Assignments:** Individual tasks to write C++ 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	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.5
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	Theory	Quizzes	2	6% (12)	Continuous	LO #1-15
		Onsite assignments	2	2% (4)	Continuous	LO #1-15
		Homework	2	2% (4)	Continuous	LO # 1-15
		Report	1	5% (5)	Continuous	LO # 1-15
	Lab		3	5% (15)	Continuous	LO # 1-15
Summative assessment	Midterm Exam		1	10% (10)	Continuous	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, image acquisition and image formation
Week 2	Sampling and quantization
Week 3	Pixel relationships and connectivity
Week 4	Mathematical tools and histogram processing
Week 5	Midterm Exam 1
Week 6	Intensity transformations
Week 7	Histogram equalization and contrast enhancement

Week 8	Spatial filtering – low pass filter
Week 9	Sharpening techniques – high pass filter
Week 10	Midterm Exam 2
Week 11	Fourier transform and frequency domain filtering
Week 12	frequency domain filtering - Low-pass filters
Week 13	frequency domain filtering - High-pass filters
Week 14	Color image processing
Week 15	Final exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Introduction to MATLAB
Week 2	Plotting and Control flow in MATLAB
Week 3	Basic Image Manipulation
Week 4	RGB (or true colour) images
Week 5	Exam
Week 6	Operations upon pixels
Week 7	Geometric Operations
Week 8	Gray – level transformations
Week 9	Exam
Week 10	neighborhood processing
Week 11	Frequency Domain Filtering
Week 12	Image linear level adjustment

Week 13	Exam
Week 14	
Week 15	

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	1. Digital Image Processing, Gonzalez R.C. 2. Digital Image Processing Using MATLAB, Gonzalez R.C.	yes
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	**Biomechanics II**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☒ **Practical** ☒ **Seminar**	
Module Code	**MDER421**				
ECTS Credits	**3**				
SWL (hr/sem)	**75**				
Module Level		UGIV	**Semester of Delivery**		Eight
Administering Department		Type Dept. Code	**College**	Type College Code	
Module Leader	Name		**e-mail**	E-mail	
Module Leader's Acad. Title		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		01/06/2020	**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	MDER221	**Semester**	Four
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. Part A - Circuit Theory DC circuits – Current and voltage definitions, Passive sign convention and circuit elements, Combining resistive elements in series and parallel. Kirchhoff's laws and Ohm's law. Anatomy of a circuit, Network reduction, Introduction to mesh and nodal analysis. [15 hrs] AC circuits I – Time dependent signals, average and RMS values. Capacitance and inductance, energy storage elements, simple AC steady-state sinusoidal analysis. [15 hrs] AC Circuits II - Phasor diagrams, definition of complex impedance, AC circuit analysis with complex numbers. [10 hrs] RL, RC and RLC circuits - Frequency response of RLC circuits, simple filter and band-pass circuits, resonance and Q-factor, use of Bode plots, use of differential equations

	and their solutions. Time response (natural and step responses). Introduction to second order circuits. [15 hrs] Revision problem classes [6 hrs] Part B - Analogue Electronics Fundamentals Resistive networks, voltage and current sources, Thevenin and Norton equivalent circuits, current and voltage division, input resistance, output resistance, coupling and decoupling capacitors, maximum power transfer, RMS and power dissipation, current limiting and over voltage protection. [15 hrs] Components and active devices – Components vs elements and circuit modeling, real and ideal elements. Introduction to sensors and actuators, self-generating vs modulating type sensors, simple circuit interfacing. [7 hrs] Diodes and Diode circuits – Diode characteristics and equations, ideal vs real. Signal conditioning, clamping and clipping, rectification and peak detection, photodiodes, LEDs, Zener diodes, voltage stabilization, voltage reference, power supplies. [15 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	5.2
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% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	
	Report	1	10% (10)	13	LO # 5, 8 and 10
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 - Difference between Circuit Theory and Field Theory
Week 2	Basics of Network Elements
Week 3	Resistance and Resistivity, Ohm's Law and Inductance, Capacitance
Week 4	Review of Kirchhoff's Laws, Circuit Analysis - Nodal and Mesh
Week 5	Linearity and Superposition, Source Transformations, Thévenin and Norton Equivalents
Week 6	Review of Inductor and Capacitor as Circuit Elements, Source-free RL and RC Circuits, Transient Response
Week 7	Mid-term Exam + Unit-Step Forcing, Forced Response, the RLC Circuit
Week 8	Sinusoidal Forcing, Complex Forcing, Phasors, and Complex Impedance, Sinusoidal Steady State Response
Week 9	Nodal and Mesh Revisited, Average Power, RMS, Introduction to Polyphase Circuits
Week 10	Mutual Inductance, Linear and Ideal Transformers, Circuits with Mutual Inductance
Week 11	Frequency Response of Series/Parallel Resonances, High-Q Circuits
Week 12	Complex Frequency, s-Plane, Poles and Zeros, Response Function, Bode Plots
Week 13	Two Port Networks, Admittance, Impedance, Hybrid, and Transmittance Parameters
Week 14	Two Port Networks, Admittance, Impedance, Hybrid, and Transmittance Parameters
Week 15	Two Port Networks, Admittance, Impedance, Hybrid, and Transmittance Parameters
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction to Agilent VEE and PSPICE
Week 2	Lab 2: Thévenin's / Norton's Theorem and Kirchhoff's Laws
Week 3	Lab 3: First-Order Transient Responses
Week 4	Lab 4: Second-Order Transient Responses
Week 5	Lab 5: Frequency Response of RC Circuits
Week 6	Lab 6: Frequency Response of RLC Circuits
Week 7	Lab 7: Filters

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Fundamentals of Electric Circuits, C.K. Alexander and M.N.O Sadiku, McGraw-Hill Education	Yes
Recommended Texts	DC Electrical Circuit Analysis: A Practical Approach Copyright Year: 2020, dissidents.	No
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	**Digital Electronics II**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MDER424**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level		UGIV	**Semester of Delivery**		Eight
Administering Department		Type Dept. Code	**College**	Type College Code	
Module Leader	Ahmed Lateef Khudaraham		**e-mail**	Ahmed.lateef771@nahrainuniv.edu.iq	
Module Leader's Acad. Title		Assistant Lecturer	**Module Leader's Qualification**		M.Sc
Module Tutor	Ahmed Lateef Khudaraham		**e-mail**	Ahmed.lateef771@nahrainuniv.edu.iq	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date		01/06/2025	**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Digital Electronic I	**Semester**	7
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. Design a digital module with combinational and sequential logic components to be able to address any problem in the applicable domain and report the results in a typical engineering design document. 2. Build a prototype of a digital logic circuit and demonstrate that it meets performance specifications, which are limited to functional correctness and resource minimization; i.e., minimal product-of-sums or sum-of-products only for combinational design. 3. Design an experiment to validate through empirical means one of the following: a hypothesis, a Boolean logic law or identity, dependency among variables, etc. Students will also be able to conduct the designed experiment, measure quantities of interest, collect and compile data, interpret the results and make engineering inferences. 4. Write an effective technical report for lab experiments. 5. Use state-of-the-art combinational and sequential logic design methodologies, techniques, and paradigms.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. an ability to apply knowledge of mathematics, science, and engineering. 2. an ability to design and conduct experiments, as well as to analyze and interpret data. 3. an ability to design a system, component, or process to meet desired needs. 4. Sequential circuits elements and sequential logic circuits 5. Modular Sequential Logic- Counters and shift registers 6. Use basic flip-flops. 7. Analyze synchronous sequential circuits. 8. Design synchronous sequential circuits. 9. Operate registers and counters.
Indicative Contents المحتويات الإرشادية	**UNIT – I [20 hrs]** **Introduction:** flip flops, Clocked flip flops, SR, JK, D, T and edge triggered flip-flops. Excitation tables of Flip flops. **State behavior of synchronous sequential circuits:** state tables; Mealy-type and Moore-type sequential circuits **UNIT – II [25 hrs]** **SYNCHRONOUS SEQUENTIAL LOGIC:** Sequential circuits, latches, analysis of clocked sequential circuits, State reduction and assignment, design procedure. **UNIT – III [28 hrs]** **REGISTERS AND COUNTERS:** Registers, shift registers, ripple counters, synchronous counters, counters with unused states, ring counter, Johnson counter.

	Code Converters, Magnitude comparator

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	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% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	15% (15)	Continuous	
Summative assessment	**Midterm Exam**	3 hr	15% (15)	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 Sequential Circuits
Week 2	Sequential Logic Circuits: Latches
Week 3	Flip-Flops: Design and Applications
Week 4	SR, D, T, and JK Flip-Flops
Week 5	Circuit and State Diagram and Timing Waveforms
Week 6	Characteristics, Excitation Tables, and Conversion Techniques of Flip-Flops
Week 7	**Mid-term Exam**
Week 8	Asynchronous Counters
Week 9	Design of Asynchronous Counters : Modules of Counters
Week 10	Timing Diagram and Truth Tables of Ripple Counters
Week 11	Synchronous Counters
Week 12	Design of Synchronous Counters : Modules of Counters
Week 13	Serial in Parallel out Register; Serial in Serial out Register
Week 14	Parallel in Serial out Register, Parallel in Parallel out Register
Week 15	Right Shift, Left Shift Register
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Sequential logic circuits
Week 2	The asynchronous counter
Week 3	The synchronous counter
Week 4	Asynchronous decade counter
Week 5	Synchronous decade counter
Week 6	Shift Registers
Week 7	Design digital circuits using hardware and software tools

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Mano M.M., Digital logic and Computer Design, Pearson Education.	Yes
Recommended Texts	Rafiquzzaman M., Fundamentals of Digital Logic and Microcomputer Design, 5th edition, JohnWiley & Sons, Inc.	No
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	Telemedicine			**Module Delivery**	
Module Type	Basic			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	MDER422				
ECTS Credits	7				
SWL (hr/sem)	175				
Module Level		IX	**Semester of Delivery**		2
Administering Department		Type Dept. Code	**College**	Type College Code	
Module Leader	Dr. Sarah Ashour Hamood		**e-mail**	sarah.ashour@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		15/06/2026	**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. Improving Healthcare Accessibility 2. Enhancing Patient Engagement 3. Reducing Healthcare Delivery Costs 4. Validating Clinical Efficacy 5. Evaluating Technological Usability 6. Optimizing Patient and Provider Satisfaction: 7. Ensuring Privacy and Regulatory Compliance
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	The students will be familiar with using medical system collaboration the communications felids with medical engineering site and create different ways in transferring the biomedical information in telecommunication and wide board of its applications in engineering field.
Indicative Contents المحتويات الإرشادية	Introduction to communications system Introduction to telemedicine and telecommunications Technologies in Medical Information Processing Technologies in Medical Information Processing Future Trend in Medical healthcare system Data Security and Compliance Medical Device Design Ensuring Usability in Telemedicine

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

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	5	5%	2,3,4,5,8,9,10	1 to 8
	Assignments/ h.w	5	5%	2,3,4,5,8,9,10	1 to 5
	Seminar.	5	5%	11	all
	Absent &Activites	5	5%	2,3,4,5,8,9,10	all
Summative assessment	**Midterm Exam**	20	20%	6,12	
	Final Exam	3hr	60%		all
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to communications system
Week 2	Introduction to telemedicine and telecommunications
Week 3	Communication Networks in Telemedicine
Week 4	Technologies in Medical Information Processing
Week 5	Technologies in Medical Information Processing
Week 6	Midterm Exam 1
Week 7	Future Trend in Medical healthcare system
Week 8	Data Security and Compliance
Week 9	Ensuring Usability in Telemedicine

Week 10	Medical Device Design
Week 11	Applications of telemedicine
Week 12	Midterm Exam 2
Week 13	Seminars
Week 14	AI in telemedicine
Week 15	preparing to 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	Fundamentals of Telemedicine and Telehealth	Yes
Recommended Texts	Telemedicine, Telehealth, and Health Information Technology	Yes
Websites	https://www.sciencedirect.com/book/edited-volume/9780128143094/fundamentals-of-telemedicine-and-telehealth	

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	**Hospital System and Design**			**Module Delivery**	
Module Type	Basic			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	**Mder515**				
ECTS Credits	**2**				
SWL (hr/sem)	**120**				
Module Level	5		**Semester of Delivery**	1	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Dr. Noor Ali Sadek		**e-mail**	Noor.a.sadek@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	1/09/2023		**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	This course has been used to help students in Creating a healing environment that promotes recovery. Ensuring that the hospital can expand to meet future demands. Implementing design features that minimize the risk of infections, such as proper ventilation and easy-to-clean surfaces. Incorporating technology into the design to support medical procedures, data management, and educational activities. Using sustainable materials in Designing hospitals that are environmentally friendly and energy-efficient. Creating a positive learning environment by providing spaces for students to decompress, and collaborate. As well as areas that allow for quiet study
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	- 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.
Indicative Contents المحتويات الإرشادية	**Indicative content includes the following.** This course provides comprehensive advice and up-to-date coverage of engineering principles in design of any health care facility, through an extensive examination of various issues. The objective is to familiarize students in engineering, designs and systems to manage any health care facility, and related fields with the areas of building construction, design standards that is crucial to addressing practical issues.

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		**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem)		**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	

الحمل الدراسي غير المنتظم للطالب خلال الفصل			
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل			

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	5	10% (10)	Continuous	LO # 2
	Assignments/ Lab.	0	0	0	
	Seminar.	0	0	0	
	Report	0	0	0	
Summative assessment	**Midterm Exam**	2 hr	30% (30)	7	LO #2
	Final Exam	3hr	60% (60)	15	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Hospitals
Week 2	Hospitals planning
Week 3	Hospitals planning
Week 4	Hospital design
Week 5	Hospital design
Week 6	patient housing system
Week 7	Mid-term Exam
Week 8	patient housing system
Week 9	Support service system
Week 10	Scientific visit to Kadhymia teaching hospital
Week 11	Support service system
Week 12	Medical services department.
Week 13	Mid-term Exam

Week 14	Medical services department.
Week 15	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	Codes For Fedral Standers	Yes
Recommended Texts	Hospital and Healthcare Facility Design" by Richard L Miller. 2nd edition.	Yes
Websites		

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Nanotechnology**			**Module Delivery**	
Module Type	Elective			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	**MDER516**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	IX		**Semester of Delivery**	1	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Dr. Sarah Ashour Hamood		**e-mail**	sarah.ashour@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	15/06/2026		**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. Enable students to be able to understand the 2. Modifies the molecular structure of materials to create smart objects. 3. To acquire the knowledge of importance of Nano-technology, Emergence, synthesis approaches of nanomaterials and challenges in Nano-technology 4. Materials design and development 5. Enhancing material performance 6. Sustainability and environmental considerations.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	The students will be familiar with using material and create nanoscale particles, and identifications tools for investigation the result, with different ways and wide board of its applications in engineering field.
Indicative Contents المحتويات الإرشادية	**Indicative content includes the following.** This course provides a comprehensive introduction to nanotechnology, covering a wide range of topics. Key areas include: •Nanotechnology research focuses on manipulating matter at the atomic scale, covering key areas like nanomaterials (graphene, carbon nanotubes), •Nanomedicine (targeted drug delivery, diagnostics), •Nano electronics (quantum dots, nano-shet), •Nano sensors (pollution detection), •Synthesis of Nanomaterials •Environmental applications (water purification), •Molecular-level manufacturing, •Advancements in quantum mechanics and microscopy. •Smart Materials •Nanostructure Identification

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

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	5	5%	2,3,4,5,8,9,10	1 to 8
	Assignments/ h.w	2	2%	2,3,4,5,8,9,10	1 to 5
	Seminar.	5	5%	11	
	Absent &Activites	3	3%	2,3,4,5,8,9,10	
Summative assessment	**Midterm Exam**	25	25%	6,12	
	Final Exam	3hr	60%		
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to nanotechnology
Week 2	Nanotechnology research focuses on manipulating matter at the atomic scale, covering key areas like nanomaterials (graphene, carbon nanotubes),
Week 3	Nanomedicine (targeted drug delivery, diagnostics),

Week 4	Nano electronics (quantum dots, nano-shets nano-tube)
Week 5	Nanomaterials applications
Week 6	Nano sensors (pollution detection),
Week 7	Mid-term Exam
Week 8	Synthesis of Nanomaterials
Week 9	Synthesis of Nanomaterials
Week 10	Environmental applications (water purification),
Week 11	Molecular-level manufacturing,
Week 12	Mid-term Exam
Week 13	Advancements in quantum mechanics and microscopy
Week 14	Smart Material.
Week 15	Nanostructure Identification
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	1- An Introduction to Nanoscience and Nanotechnology by Alain Nouailhat 2- Introduction to nano : basics to nanoscience and nanotechnology by Sengupta, Amretashis, editor.; Sarkar, Chandan Kumar, editor.; SpringerLink 2015.	Yes
Recommended Texts	introduction no nanotechnology	Yes
Websites	https://link.springer.com/chapter/10.1007/978-981-99-6105-4_1?fromPaywallRec=true	

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	**Surgery for Biomedical Engineering**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	**MDER525**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	X		**Semester of Delivery**	2	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Dr. Sarah Ashour Hamood		**e-mail**	sarah.ashour@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	15/06/2026		**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. Enable students to be able to understand the 2. Modifies the molecular structure of materials to create smart objects. 3. To acquire the knowledge of importance of Nano-technology, Emergence, synthesis approaches of nanomaterials and challenges in Nano-technology 4. Materials design and development 5. Enhancing material performance 6. Sustainability and environmental considerations.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	The students will be familiar with robotics and surgical machine and modern techniques in side the operating rooms with different ways and wide board of its applications in engineering field as combinations with medical site.
Indicative Contents المحتويات الإرشادية	**Indicative content includes the following.** This course provides a comprehensive introduction to nanotechnology, covering a wide range of topics. Key areas include: 1. Robotic Surgery and Automation 2. Surgical Imaging and Navigation 3. Surgical Device and Tool Design 4. Biomaterials and Tissue Engineering 5. Surgical Simulation and Training 6. Minimally Invasive Techniques (MIS) 7. Data Analytics and Artificial Intelligence 8. Biomechanics in Surgery 9. Medical Imaging Technologies CT and MRI and Ultrasound and Fluoroscopy

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

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

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	5	5%	2,3,4,5,8,9,10	1 to 8
	Assignments/ Activity	2	2%	2,3,4,5,8,9,10	1 to 5
	Seminar.	3	3%	11	
	lab.	10	10%	2,3,4,5,8,9,10	
Summative assessment	**Midterm Exam**	20	20%	6,12	
	Final Exam	3hr	60%		
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	1. Robotic Surgery and Automation
Week 2	2. Surgical Imaging and Navigation
Week 3	3. Surgical Device and Tool Design
Week 4	4. Biomaterials and Tissue Engineering

Week 5	5. Surgical Simulation and Training
Week 6	6. Minimally Invasive Techniques (MIS)
Week 7	7. Midterm Exam 1
Week 8	8. Biomechanics in Surgery
Week 9	9. Medical Imaging Technologies CT and MRI and Ultrasound and Fluoroscopy
Week 10	10. Data Analytics and Artificial Intelligence
Week 11	2. Surgical system Navigation
Week 12	3. applications of devices
Week 13	4. Midterm Exam 2
Week 14	5. Seminars
Week 15	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1. Robotic Surgery and Automation
Week 2	Lab 2. Surgical Imaging and Navigation
Week 3	Lab 3. Surgical Device and Tool Design
Week 4	Lab 4. Biomaterials and Tissue Engineering
Week 5	Lab 5. Surgical Simulation and Training
Week 6	Lab 6. Minimally Invasive Techniques (MIS)
Week 7	Lab 7: Applications

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1- An Engineering for Surgery text book by NP Belfiore · 2020	Yes
Recommended Texts	1- An Engineering for Surgery text book by NP Belfiore · 2020	Yes

	2- Quantitative Biomedical Optics.Theory, Methods, and Applications; by Irving J. Bigio, Sergio Fantini. 3- Biomedical Engineering Fundamentals by Joseph D. Bronzino, Donald R. Peterson	
Websites	chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://mdpi-res.com/bookfiles/book/2583/Engineering_for_Surgery.pdf?v=1772071400	

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	**Biotribology**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☒ **Practical** ☒ **Seminar**	
Module Code	**MDER522**				
ECTS Credits	**2**				
SWL (hr/sem)	**30**				
Module Level		UGIV	**Semester of Delivery**		Seven
Administering Department		Type Dept. Code	**College**	Type College Code	
Module Leader	Dr Sadiq Jafar Hamandi		**e-mail**	sadiq.j.abbas@nahrainuniv.edu.iq	
Module Leader's Acad. Title		Ass. 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		01/06/2020	**Version Number**		1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	MDER410, MDER420	**Semester**	Three
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. Introduce the fundamentals of friction and its relevance in component design and surface engineering. 2. Introduce key tribological principles related to wear, methods for mitigation and underpinning mathematical concepts. 3. Introduce the theory of contact mechanics and evaluate its impact on the performance of components. 4. Develop the ability to apply lubrication science to engineering components. 5. 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 6. Develop solutions to biotribological industrial design problems through the application of biotribological analysis.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Clearly distinguish between the friction, wear, and lubrication. 2. Think critically about the tribology of the human joints. 3. Identify factors influencing the friction and wear. 4. Explain the ways to reduce friction and wear. 5. Describe the biomechanical contributions to human and artificial joints
Indicative Contents المحتويات الإرشادية	Introduction to tribology (2 Hours) Introduction to biotribology (2 Hours) Surfaces (2 Hours) Friction (4 Hours) Wear-new (4 Hours) Wear Measurements (2 Hours) Lubrication (6 Hours) Human Joints (4 Hours) Artificial Joints (4 Hours)

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	87	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.8
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 3
	Assignments	2	10% (10)	2, 12	LO # 4, and 5
	Projects / Lab.	1	10% (10)	Continuous	
	Report	1	10% (10)	13	LO # 3, 4 and 5
Summative assessment	**Midterm Exam**	3 hr	10% (10)	7	LO # 1-5
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction
Week 2	Surfaces of the bodies
Week 3	Friction
Week 4	The Adhesion theory of friction
Week 5	Wear
Week 6	Corrosion of implant materials
Week 7	Wear Measurements
Week 8	Midterm Exam 1
Week 9	Lubrication
Week 10	Lubrication Mechanism

Week 11	Tribology of Human Joints
Week 12	Types of lubrication of surfaces
Week 13	Types of Lubrication specific to synovial joints
Week 14	Mechanisms of lubrication in artificial joints
Week 15	Midterm Exam 2
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	
Week 8	
Week 9	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Tribology, a systems approach to the science and technology of friction, lubrication and wear, Hbrst Czichos	No
Recommended Texts	Introduction to Tribology, Bharat Bhushan	No
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	**Professional Ethics**			**Module Delivery**	
Module Type	**Support**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**UREQ510**				
ECTS Credits	**1**				
SWL (hr/sem)	**15**				
Module Level		UGV	**Semester of Delivery**		10
Administering Department		Type Dept. Code	**College**	Type College Code	
Module Leader	Dr Sadiq Jafar Hamandi		**e-mail**	sadiq.j.abbas@nahrainuniv.edu.iq	
Module Leader's Acad. Title		Ass. 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		01/06/2020	**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. Connect theory to practice 2. Emphasize the importance of integrity and ethics to everyday life 3. Encourage critical thinking 4. Stress not only the importance of making ethical decisions but also demonstrate how to implement the decisions 5. Use innovative interactive teaching methods 6. Balance general ethics with applied ethics 7. Draw on good practices from practitioners 8. Link integrity and ethics to other global issues and the SDGs 9. Adopt a multi-disciplinary and multi-level approach 10. Focus on global ethics and universal values while leaving room for diverse regional and cultural perspectives 11. Employ non-technical and clear terminology 12. Be user-friendly
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Clearly distinguish between personal, theoretical, and professional ethics 2. Think critically about ethical issues which are encountered first hand within a career, and apply personal, theoretical, and professional ethics to vexing moral decisions within specific professions 3. Grasp the challenges posed by potential conflicts between role morality and personal morality, and consider ways of resolving those conflicts 4. Understand the role of professional codes of ethics, the difference between aspirational and disciplinary codes of ethics, and how professional codes may apply in their career0
Indicative Contents المحتويات الإرشادية	مفهوم أخلاقيات المهنة (2 ساعة) المقومات العامة لأخلاقيات المهنة (2 ساعة) الاخلاق التي لها صلة مباشرة بأخلاقيات المهنة (8 ساعة) اخلاقيات مهنة الهندسة (42 ساعة) اخلاقيات ممارسة مهنة الهندسة (2 ساعة) تاريخ المدونات الهندسية (2 ساعة) المدونات والمهن (2 ساعة) تعدد مدونات قواعد السلوك (2 ساعة) كوارث هندسية (2 ساعة) تدريس أخلاقيات المهنة (2 ساعة) أمثلة من مدونات أخلاقيات المهنة (2 ساعة)

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	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

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, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	
	Report	1	10% (10)	13	LO # 5, 8 and 10
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	مفهوم أخلاقيات المهنة
Week 2	المقومات العامة لأخلاقيات المهنة
Week 3	الاخلاق التي لها صلة مباشرة بأخلاقيات المهنة
Week 4	الاخلاق التي لها صلة مباشرة بأخلاقيات المهنة
Week 5	الاخلاق التي لها صلة مباشرة بأخلاقيات المهنة
Week 6	الاخلاق التي لها صلة مباشرة بأخلاقيات المهنة
Week 7	اخلاقيات مهنة الهندسة
Week 8	تاريخ المدونات الهندسية
Week 9	المدونات والمهن
Week 10	تعدد مدونات قواعد السلوك
Week 11	كوارث هندسية
Week 12	تدريس أخلاقيات المهنة
Week 13	أمثلة من مدونات أخلاقيات المهنة
Week 14	أمثلة من مدونات أخلاقيات المهنة
Week 15	أمثلة من مدونات أخلاقيات المهنة
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	قواعد واخلاقيات ممارسة مهنة الهندسة	Yes
Recommended Texts	الهندسة مهنة اخلاق ميثاق	No
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	Micro Electro Mechanical System (MEMS).			**Module Delivery**	
Module Type	Basic			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	**MDER520**				
ECTS Credits	**2**				
SWL (hr/sem)	**120**				
Module Level	5		**Semester of Delivery**	2	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Dr. Noor Ali Sadek		**e-mail**	Noor.a.sadek@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	28/01/2024		**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 course gives knowledge of -Machine elements and their design, functional principles, mechanisms, and integration in machinery -The functions of some common machine elements and the solution of design and engineering problems associated with these machines - It should be cross-referenced with the program specification basis in subsystem or component -The application of design criteria for different (electromechanical) functional and design requirements for various machine elements and components - Choice of reasonable design and engineering solutions with basis in basic understanding of mechanical behavior and design criteria.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	- Understanding How micro system Function. - Learning of manufacturing techniques used in MEMEs. - Designing of new surgical tool by using MEMS. - Thinking robots and robotic surgery. - Understanding some application of MEMS in drug delivery, microneedles and patches, and retinal implant.
Indicative Contents المحتويات الإرشادية	**Indicative content includes the following.** This course provides comprehensive advice and up-to-date coverage of engineering principles in design of any micro sized parts used in biomedical application, through an extensive examination of various issues. The objective is to familiarize students in engineering, designs and systems to create any health aid parts or devices, that are of miniature size and could be used inside human body without harm.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Lectures where the students write information presented to them via slide show, overhead or written by the lecturer; • Lectures where the students have some printed notes/handouts and may annotate, or expand these during a spoken lecture; • Seminars with questions and answer sessions during lectures or staff Office Hours

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

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	5	5% (5)	Continuous	LO # 4
	Assignments/ Lab.	0	0	0	
	Seminar.	1	5% (5)	14	
	Report	0	0	0	
Summative assessment	**Midterm Exam**	2 hr	30% (30)	7	LO #4
	Final Exam	3hr	60% (60)	15	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	BioMEMS Technologies
Week 2	Materials for MEMS manufacturing
Week 3	MEMS process steps
Week 4	Biocompatibility and Packaging
Week 5	Mid-term Exam
Week 6	Generation of Surgical Procedures
Week 7	Using Tactile Sensor In Surgical Tool
Week 8	Printable Strain Gauges
Week 9	The BioTac Design

Week 10	Types of Drug Delivery System
Week 11	Microneedle Patches
Week 12	Retinal Implant.
Week 13	Mid-term Exam
Week 14	seminars.
Week 15	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	Electromechanical Design Handbook 3rd Edition by Ronald A Walsh	no
Recommended Texts		
Websites	https://archive.org/details/MEMS0000came/mode/1up https://www.scribd.com/document/110659487/MEMS-and-Biomedical-Engineering	

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