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

2023-2024

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.

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.

Academic Program Description Form

University Name: Al-Nahrain

Faculty/Institute: Engineering

Scientific Department: Biomedical Engineering

Academic or Professional Program Name: Biomedical Engineering

Final Certificate Name: Biomedical Engineering

Academic System: Semesters (1st Semester, 2nd Semester)

Description Preparation Date: 12/09/2023

File Completion Date: 1/03/2024

Signature:

Head of Department Name:
Asst. Prof. Dr. Auns Q. Al-Neami

Date: 21/4/2024

Signature:

Scientific Associate Name:
Prof Dr. Naser A. Alkabbi

Date: 21/4/2024

The file is checked by:

Department of Quality Assurance and University Performance

Director of the Quality Assurance and University Performance Department:

Date: 21/4/2024

Signature:

21/4/2024
Approval of the Dean

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.**

Course Description Form

Biomedical Engineering Department

Mathematics III

1. Course Name:
Mathematics III
2. Course Code:
MATH210
3. Semester / Year:
1st / 2nd year
4. Description Preparation Date:
12/9/2023
5. Available Attendance Forms:
Attendance, only
6. Number of Credit Hours (Total) / Number of Units (Total)
4 hours / week, total =60 hr , Number of Units: 3 units.
7. Course administrator's name (mention all, if more than one name)
Name: Lecturer Dr. Ali M. Miftin Email: ali.m.miftin@nahrainuniv.edu.iq
8. Course Objectives

Course Objectives The student will study mathematical theories and application. On completion of this course the student will be able to:	1. Evaluate integrals that require certain techniques 2. Identify some kinds of series and do algebraic manipulations 3. Test the series for convergence 4. Find the inverse of a matrix and use matrices to solve simultaneously linear equations
9. Teaching and Learning Strategies	
Strategy	- applying concepts in the real world - problem solving – based leaning strategy - collaborative concept planning

10. Course Structure					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
1	4	A1 B1 C3	Techniques of Integration -Using Basic Integration Formulas -Integration by Parts	Lecture	HW
2	4	A1 B1 C3	-Trigonometric Integrals Trigonometric Substitutions	Lecture	HW
3	4	A1 B1 C3	-Integration of Rational Functions by Partial Fractions -Improper Integrals	Lecture	Seminar
4	4	A1 B1 C3	Integration using the transformation z=tan(x/2)	Lecture	HW Onsight assignment
5	4	A2 B2 C3	Infinite Sequences and Series -Sequences -Examples	Lecture	HW Quiz
6	4	A2 B2 C3	-Infinite Series -Examples	Lecture	HW
7	4	A2 B2 C2	-The Integral Test -Examples	Lecture	HW
8	4	A2 B2 C3	- Comparison Tests -Examples	Lecture	HW
9	4		MID EXAM -Absolute Convergence; The Ratio and Root Tests -Examples	Exam	Exam
10	4	A2 B2 C2	-Alternating Series and Conditional Convergence -Examples	Lecture	HW Onsight assignment
11	4	A2 B2 C2	-Power Series -Examples	Lecture	HW

12	4	A2 B3 C3	- Taylor and Maclaurin Series -Examples	Lecture	Quiz
13	4	A3 B3 C3	Matrices-Introduction	Lecture	HW
14	4	A3 B3 C2	-Determinant of a matrix -Inverse Of a matrix (operations on rows) -Inverse Of a matrix (by minor cofactors , Adj)	Lecture	Seminar
15	4		Cramer rule and singular matrix MID EXAM	Exam	Exam

11.Course Evaluation
Distributing the score out of 100 according to the tasks assigned: MID EXAMS 30, Homework assignments and quizzes 10, Final Exam 60.

12.Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Thomas' calculus: Early Transcendentals
Main references (sources)	
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	Microsoft Math soft MathCad Autograph

Course Description Form

1. Course Name:
Cell biology
2. Course Code:
MDER 213
3. Semester / Year:
1st / second
4. Description Preparation Date:
12.09.2023
5. Available Attendance Forms:
Attendance, only
6. Number of Credit Hours (Total) / Number of Units (Total)
3 hours / week, total =45hr
7. Course administrator's name (mention all, if more than one name)
Name: Lecturer Dr. Dunia Tahseen Nema Email: dunia.t.nema@nahrainuniv.edu.iq
8. Course Objectives

Course Objectives	The course is designed to teach the students: 1. A comprehensive understanding of the structure, function, and process of cells and the human body. 2. Understands behavior of the cells 3. Unravel the complexities of living organisms at the cellular level. 4. Knowledge of cell biology improves understanding of the human body; how it works, and its place in the natural world.
9. Teaching and Learning Strategies	
Strategy	**Learning Strategies:** Encourage students to take organized notes during lectures. Provide practice questions and problem-solving exercises. Participate actively in group discussions and collaborative activities. Make use of textbooks, online resources, and supplementary materials to reinforce learning. Provide constructive feedback on assignments and assessments. Feedback helps students understand their strengths and areas for improvement. **Teaching Strategies:** - Encourage students to actively engage with the material through discussions and group activities to promote deeper understanding. - Deliver well-structured lectures that provide a clear overview of the topic. - Incorporate videos, animations, and interactive simulations to illustrate complex biological processes. - Assign readings or video lectures as homework and use class time for discussions and activities.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
	3	The students will be able to : Understand the cells as they are the smallest unit of living organisms (definition, theory, and types of cells).	Cells type	Lectures Tutorials	Quizzes Home works Discussion
	3	The students will be able to : Understand organelles, , in details.	Organelles	Lectures Tutorials	Quizzes Home works Discussio
	3		Organelles	Lectures Tutorials	Quizzes Home works Discussion
	3		Organelles	Lectures Tutorials	Quizzes Home works Discussion
	3		Organelles	Lectures Seminars Tutorials	Quizzes Home works Discussion
	3	The students will be able to : Understand the nucleic acid and nitrogen bases. And the structure of DNA and RNA molecules .	DNA and RNA	Lectures Tutorials	Quizzes Home works Discussion
	3		Cells type Organelles DNA and RNA	Lectures	Mid1
	3	The students will be able to : 1. Understand the transport across the plasma membrane	Transport	Lectures Tutorials	Quizzes Home wor
	3	The students will be able to : Understand the gene and gen expiration.	Gen Expiration	Lectures Tutorials	Quizzes Home wor

	3	The students will be able to : the processes of Protein synthesis, type of RNA and their functions.	Protein synthesis	Lectures Tutorials	Quizzes Home wor
	3	The students will be able to : Studying cell division	Cell cycle	Lectures Tutorials	Quizzes Home wor
	3	Another learning outcome is understanding cellular organization and reproduction.	Reproductiv	Lectures Tutorials	Quizzes Home wor
	3	Understand the development of human body cells . Studying cell biology forms the foundation for advancements in medical research, biotechnology, and our comprehension of life processes.	Human cells	Lectures Tutorials	Quizzes Home wor
	3		Gen Expiration, protein synthesis Cell cycle Reproduction	Lectures	Mid2
	3		Subject about cell	Seminar	Presentation and Discussion

11. Course Evaluation	
Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc Mid (25) Quizzes (15) Final Exam (60)	
12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	International-GCSE-Human-Biology-Student-Book
Main references (sources)	"Biology" by Neil A. Campbell and Jane B. Reece
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	https://ia601502.us.archive.org/24/items/cnx-org-col11903/clark-college-human-biology.pdf

Course Description Form

1. Course Name:	
Electronic I	
2. Course Code:	
MDER212	
3. Semester / Year:	
First / second	
4. Description Preparation Date:	
2023/9/12	
5. Available Attendance Forms:	
Attendance only only	
6. Number of Credit Hours (Total) / Number of Units (Total)	
Lectures (2 hours/week), Tutorials (1 hour/week), Laboratory Sessions (2 hours/week) /3units	
7. Course administrator's name (mention all, if more than one name)	
Name: Dr. Ahmed faeq Email: ahmed.f.hussein@nahrainuniv.edu.iq	
8. Course Objectives	
Course Objectives	• Understand the fundamental principles of semiconductor physics and operation of electronic devices, particularly diodes and bipolar junction transistors (BJTs). • Analyze the electrical characteristics of diodes and apply them in various electronic circuits like rectifiers, clippers, and clampers. • Grasp the biasing techniques for BJTs and perform DC analysis of BJT circuits to determine operating points. • Employ small-signal AC models for BJTs to analyze their frequency response and gain characteristics. • Design and understand the operation of basic single-stage BJT amplifiers (common emitter, common base, common collector). • Appreciate the concept of feedback in BJT amplifiers and its impact on stability. • Gain practical experience through laboratory experiments to reinforce theoretical concepts and develop basic circuit analysis skills. • Enhance written communication skills through the preparation of clear and concise laboratory reports.
9. Teaching and Learning Strategies	
Strategy	• **Active participation in lectures:** Engage in discussions, ask questions, and actively participate in problem-solving activities presented during lectures. • **Thorough review of textbook materials:** Diligently study the assigned textbook chapters before and after lectures to solidify your understanding of the concepts. • **Attending tutorials:** Utilize the tutorial sessions to clarify any doubts arising from lectures, solve practice problems under the guidance of the instructor, and gain a deeper understanding of complex topics. • **Effective laboratory participation:** Actively participate in the laboratory • sessions, meticulously follow the provided instructions, record data accurately, and analyze the results to draw meaningful conclusions. • **Completing laboratory reports:** Write clear and concise laboratory reports that document your experimental procedures, data analysis, and interpretations. • **Independent learning:** Utilize online resources, additional textbooks, or relevant articles to supplement your learning and explore topics in greater depth.

	• **Collaborative learning:** Form study groups with your peers to discuss course materials, solve problems collaboratively, and enhance your learning through peer interaction.

10. Course Structure

Week	Hours (Lecture/Tutorial/Lab)	Required Learning	Topics	Evaluation
1 (Intro)	3 (2/1/0)	None	Course Overview, Circuit Theory Review	-
2	3 (2/1/0)	Basic Semiconductor Physics	PN Junction, Diode Operation	-
3	3 (2/1/0)	Diode Characteristics	I-V Characteristics, Forward & Reverse Bias	-
4	3 (2/1/0)	Diode Applications	Rectifiers (Half-Wave, Full-Wave), Clipping & Clamping Circuits	-
5	3 (2/1/0)	Bipolar Junction Transistors (BJTs)	BJT Structure, NPN & PNP Types	-
6	3 (2/1/0)	BJT Biasing	Operating Points (Q-Point), Biasing Techniques	-
7	3 (2/1/0)	DC Analysis of BJT Circuits	DC Current Flow, Small Signal Equivalent Circuits	-
8 (Midterm)	3 (2/1/0)	-	BJT AC Analysis	Midterm Exam (25%)
9	3 (2/1/0)	-	Small-Signal AC Models (h-parameters)	-
10	3 (2/1/0)	-	Frequency Response of BJT Amplifiers	-
11	3 (2/1/0)	-	BJT Amplifier Design	-
12	3 (2/1/0)	-	Feedback in BJT Amplifiers	-
13	2 (Lecture)/1 (Lab Report Review)	Laboratory Reports 1 & 2	Review of Labs 1 & 2, Lab Report Preparation Techniques	Lab Reports (15%)
14	0 (Lecture)/0 (Tutorial)/5 (Lab)	None	Laboratory Experiments (e.g., Diode Characteristics, BJT Biasing)	-
15	3 (2/1/0)	None	Course Review, Q&A Session	-
-	-	Textbook (specific title provided), Calculator, Lab Notebook	-	Final Exam (60%)

11. Course Evaluation

12. Learning and Teaching Resources	
Required textbooks (curricular books, any)	Electronic Devices and Circuit Theory by Robert L. Boylestad and Louis Nashelsky (This is a widely used textbook that covers the core topics of this course in a comprehensive and student-frier manner.)
Main references (sources)	Microelectronic Circuits by Adel S. Sedra and Kenneth C. Smith (This is a more advanced textbook that offers a deeper dive into electronic devices and circuits, particularly suitable for students seeking a more rigorous understanding.)

Course Description Form

1. Course Name:	
Materials Science	
2. Course Code:	
MDER211	
3. Semester / Year:	
First /second year	
4. Description Preparation Date:	
12/9/2023	
5. Available Attendance Forms:	
Attendance only	
6. Number of Credit Hours (Total) / Number of Units (Total)	
4 hours / weak, total = 60 hr / Number of Units: 2	
7. Course administrator's name (mention all, if more than one name)	
Name: Dr Alaa Ayyed Jebur Al-Taie Email: alaa.ayyed@nahrainuniv.edu.iq	
8. Course Objectives	
Course Objectives	1. 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. 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. 5. Advancing Materials Science and Engineering: the advancement of materials science and engineering. Researchers can gain insights into fundamental material properties, surface modifications, degradation mechanisms, and fabrication techniques. The aim is to develop the fabrication methods, and characterization techniques that can have broader applications beyond the field of materials .
9. Teaching and Learning Strategies	
Strategy	– Active Learning and Brainstorming – Real-World Applications – Collaborative Learning

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Knowledge of materials	Introduction to materials science	Lecture	1.Exams 2. Quiz 3. Reports
2	2	Material processing and synthesis, Material properties and behavior, Material selection and design	Metallic, polymer, ceramics and composites structures	Lecture	
3	2	Material properties and behavior	Metal Structure and Bonding in Materials	Lecture	
4	2	Material properties and behavior	Crystalline Structures	Lecture	
5	2	Material properties and behavior	NONCRYSTALLINE SOLIDS and miller indices	Lecture	
6	2	Material properties and behavior	Planar density	Lecture	
7	2	Material properties and behavior	linear density	Lecture	
8	2	Materials in different applications, Material selection and design	Properties of Engineering Materials	Lecture	
9-10	4	, Understanding material performance and failure	Mechanical Properties of Engineering Materials	Lecture	
11-12	4	Understanding material performance and failure, Material selection and design	HARDNESS	Lecture	
13-14	4	Understanding material performance and failure	Phase equilibrium diagram	Lecture	
15	3	Final Exam			

11. Course Evaluation

Midterm exams: 20
Quizzes: 5
PRACTICAL LAB: 15
Final Exam: 60

12. Learning and Teaching Resources

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

Course Description Form

Engineering Mechanics I

1. Course Name:	
Engineering Mechanics I	
2. Course Code:	
MDER210	
3. Semester / Year:	
1st semester/ 2nd year	
4. Description Preparation Date:	
2023/9/12	
5. Available Attendance Forms:	
Attendance, only	
6. Number of Credit Hours (Total) / Number of Units (Total)	
4 hr/ 3 Units	
7. Course administrator's name (mention all, if more than one name)	
Name: Dr Aseel Mohammed Ali Hussein Email: aseel.m.ali@nahrainuniv.edu.iq	
8. Course Objectives	
Course Objectives	The Engineering Statics course provides the basic concepts and skills that form the foundation for structural and mechanical design. The class is a problem-focused engineering science class that helps engineering students develop the ability to understand and analyze static forces on a variety of structures and engineering applications.
9. Teaching and Learning Strategies	
Strategy	Lectures supported by modes developing material covered in lectures. These modes include problem-solving tutorials

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Determine rectangular components of a of a vector	Vectors & Matrices	Lecture & HW	
2	4	Determine rectangular components of a force	Force systems: 2D force system	Lecture & HW	Assignment
3	4	Obtain the moment of a given system	Moment	Lecture & HW	
4	4	Obtain the equivalent force – couple system of a given syste	Couple	Lecture	Assignment
5	4	Obtain the resulttant of a given system	Resultants	Lecture & HW	
6	2		Semester Examination 1		
7	4	Analyze the equilibrium state of a particle and rigid body	Equilibrium	Lecture	
8	4	Draw free-body diagrams	Construction a free-body diagrams	Lecture	
9	4	Formulate and solve the equations of equilibrium	Equilibrium conditions: Two – dimensions	Lecture	Assignment
10	4	Analyze internal forces for simple structures	Structures: Machine Frames	Lecture	
11	2		Semester Examination 2		
12	4	Determine friction forces and their effects on rigid bodies	Friction	Lecture	

13	4	Determine friction forces and their effects on rigid bodies	Application of friction	Lecture	Assignment
14	4		Belts	Lecture	
15	2		Semester Examination 3		

11. Course Evaluation

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

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Engineering Mechanics – Volume 1 Statics + Volume 2 Dynamics, J. L. Meriam & L. G. Kraige, 4th edition, John Wiley & Sons Inc., 1988
Main references (sources)	
Recommended books and references (scientific journals, reports...)	1. J. L. Meriam and L. G. Kraige, Engineering Mechanics, Vol. I – Statics, Vol. II – Dynamics, 5th Ed., John Wiley, 2002. 2. J. L. Meriam and L. G. Kraige, Engineering Mechanics, Vol. I – Statics, Vol. II – Dynamics, 7th Ed., John Wiley, 2006.
Electronic References, Websites	

Course Description Form

1. Course Name:

Management Principles

2. Course Code:

UREQ211

3. Semester / Year:

1nd / first year

4. Description Preparation Date:

12/9/2023

5. Available Attendance Forms:

Attendance, only

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

1 hours / week, total =15 hr/ 1unit

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

Name: Assis. Prof. Dr. Sufian M. Salih
Email: sufian.m.salih@nahrainuniv.edu.iq

8. Course Objectives

Course Objectives

the sample course objectives for a course on "Management Principles." These objectives are designed to provide a comprehensive understanding of fundamental management concepts and practices:

Introduction to Management:

- Define the concept of management and its significance in organizations.
- Explore the historical development and evolution of management theories.

Functions of Management:

- Analyze the four key functions of management: planning, organizing, leading, and controlling.
- Illustrate how these functions are interconnected and essential for organizational success.

Management Styles and Approaches:

- Examine various management styles and approaches, including autocratic, democratic, transformational, and situational leadership.
- Evaluate the effectiveness of different styles in different organizational contexts.

Strategic Management:

- Introduce the principles of strategic management and its role in organizational sustainability.
- Analyze the process of formulating, implementing, and evaluating organizational strategies.

Organizational Structure and Design:

- Explore different types of organizational structures and their impact on communication, decision-making, and efficiency.
- Discuss organizational design principles and their alignment with strategic goals.

Leadership and Motivation:

- Examine theories of leadership and motivation, including trait theory, behavioral theories, and contemporary approaches.
- Assess the role of effective leadership in motivating individuals and teams.

Decision-Making and Problem Solving:

- Analyze the decision-making process and various models for problem-solving in organizations.
- Develop critical thinking skills in evaluating alternatives and making informed decisions.

Communication and Conflict Management:

- Emphasize the importance of effective communication in management.
- Provide strategies for conflict resolution and management within teams and organizations.

Human Resource Management:

- Introduce the principles of human resource management, including recruitment, training, performance appraisal, and employee relations.
- Explore the impact of HR practices on organizational culture and success.

Ethics and Social Responsibility in Management:

- Discuss the ethical challenges faced by managers and organizations.
- Explore the concept of social responsibility and its integration into management practices.

Change Management:

- Analyze the process of organizational change and the role of managers in leading change initiatives.
- Evaluate strategies for managing resistance to change.

Global Management and Cultural Competence:

- Explore the challenges and opportunities of managing in a global context.
- Develop cultural competence and an understanding of diverse management practices.

Innovation and Entrepreneurship:

- Discuss the role of innovation and entrepreneurship in organizational success.
- Explore strategies for fostering a culture of innovation within an organization.

Measurement and Evaluation:

- Introduce key performance indicators (KPIs) and metrics for measuring organizational performance.
- Develop skills in evaluating and improving management processes.

Practical Applications and Case Studies:

- Apply management principles to real-world scenarios through case studies and practical exercises.
- Develop problem-solving skills and the ability to apply theoretical concepts in practice.

9. Teaching and Learning Strategies

Strategy

Effective teaching and learning strategies for a course on Management Principles should engage students, promote

critical thinking, and provide practical application of theoretical concepts. Here are various teaching and learning strategies t

Interactive Lectures:

- Engage students through interactive lectures where they can ask questions, participate in discussions, and
- share their perspectives.
- Use multimedia presentations, real-world examples, and case studies to illustrate management principles.

Case-Based Learning:

- Utilize case studies to analyze real-world management scenarios. Encourage students to apply theoretical
- concepts to solve practical problems.
- Conduct group discussions and presentations based on case analyses.

Class Discussions and Debates:

- Foster class discussions on management principles, encouraging students to express their opinions and
- engage in debates.
- Assign debate topics related to management theories, styles, or ethical dilemmas.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1 2	3 3	Learning outcomes related to	The specific unit or subject name	The learning method for	The evaluation methods for a r principles course aim to assess

3 4 5 6 7 8 9 10 11 12 13 14 15	3 3 3 3 3 3 3 3 3 3 3 3 3	management principles typically focus on developing knowledge, skills, and attitudes that enable individuals to effectively understand, apply, and contribute to various aspects of management. Here are some key learning outcomes associated with management principles: **Understanding Management Concepts:** • Define and explain fundamental management concepts, including planning, organizing, leading, and controlling. • Demonstrate a comprehensive understanding of key management theories and their historical development. **Strategic Thinking:** • Develop the ability to think strategically and analyze organizational environments. • Formulate and articulate clear organizational goals and objectives. **Decision-Making Skills:** • Enhance decision-making skills through the application of decision models and critical thinking. • Evaluate the impact of decisions on organizational performance and stakeholders. **Leadership Development:** • Identify and analyze	associated with the learning outcomes related to management principles will depend on the academic institution, curriculum, or training program. However, here are some common names that are often used for courses or units covering management principles: Principles of Management Introduction to Management Management Fundamentals Organizational Management Business Management Strategic Management Leadership and Management Management and Organizational Behavior Foundations of Management . Management Theory and Practice . Business Administration . Management and Decision-Making . Contemporary **Management Issues** . **Corporate Leadership** . **Executive Management**	management principles often involves a combination of theoretical knowledge, practical application, and experiential learning. Here are various methods commonly employed in teaching management principles: **Lectures:** • Traditional lectures provide a foundation of theoretical knowledge, covering key management concepts, principles, and theories. **Case Studies:** • Analyzing real-world case studies allows students to	understanding of theoretical co ability to apply these concepts scenarios, and the developmen skills. Here are common evalu methods used in management **Examinations:** • Traditional written exams a knowledge of management principles, and terminology **Assignments and Essays:** • Research papers, essays, or assignments allow students deeper into specific manage demonstrating critical think skills. **Case Analysis:** • Evaluating students' ability solve real-world manageme provides insights into their application of theoretical kn **Presentations:** • Oral presentations or group assess students' communica their ability to convey infor effectively, and their grasp management concepts. **Class Participation:** • Active participation in class debates, and group activitie students' engagement with t and their ability to articulat their viewpoints. **Group Projects:** • Collaborative projects asses leadership, and the applicat management principles in a **Quizzes and In-Class Assessm** • Short quizzes or in-class as be used to gauge understan topics and ensure regular en the course content. **Midterm and Final Exams:** • Splitting the assessment int final exams allows for prog evaluation and provides stu feedback on their progress. **Portfolio Assessment:** • Building a portfolio that inc reflections, assignments, an throughout the course allow comprehensive evaluation o learning journey. . **Peer Evaluation:** • Incorporating peer assessm

		various leadership styles and their impact on organizational culture. • Demonstrate effective leadership skills, including communication, motivation, and conflict resolution. **Organizational Behavior:** • Understand the principles of organizational behavior and its impact on individual and group performance. • Analyze factors influencing employee behavior and organizational culture. **Effective Communication:** • Develop effective communication skills, both oral and written, for diverse audiences within and outside the organization. • Apply communication strategies to enhance team collaboration and organizational effectiveness.		apply theoretical concepts to practical situations, fostering critical thinking and problem-solving skills. **Group Discussions:** • Engaging in group discussions encourages collaboration, communication, and the sharing of diverse perspectives on management issues. • .	projects or presentations en students to evaluate the con their peers, fostering teamw accountability. **. Practical Simulations:** • Using simulations or role-p exercises to mimic real-wor management scenarios allow apply theoretical knowledg simulated environment. **. Online Quizzes and Tests:** • Incorporating online assess learning management syste evaluate understanding and a digital format. **. Reflection Papers:** • Asking students to write ref on their learning experience faced, and personal growth insights into their overall de **. Industry Reports or Analysis** • Assigning projects that invo researching and analyzing i competitors, and organizati can assess students' ability t management principles in a context. **. Continuous Assessment:** • Implementing a continuous approach, where students ar through a combination of as quizzes, and participation o duration of the course.

11.Course Evaluation

Midterm Evaluation:

- Collect feedback on the course structure, teaching methods, and materials midway through the semester.
- Ask specific questions about what is working well and areas for improvement.

End-of-Course Evaluation:

- Gather comprehensive feedback at the end of the course.
- Include questions on course content, teaching effectiveness, assessments, and overall satisfaction

12. Learning and Teaching Resources	
Required textbooks (curric books, if any)	**"Principles of Management" by Harold Koontz and Cyril O'Donnell:** • This classic book provides a comprehensive introduction to the principles of management, covering planning, organizing, staffing, directing, and controlling. **"Management: A Practical Introduction" by Angelo Kinicki and Brian Williams:** • Known for its practical approach, this book covers fundamental management concepts and include real-world examples and applications. **"Management" by Stephen P. Robbins and Mary A. Coulter:** • Robbins and Coulter's book explores essential management concepts, organizational behavior, and the challenges faced by managers in the modern business environment. **, and David S. Moore:** • Known for its emphasis on active learning and data analysis, suitable for high school or college-level courses.
Main references (sources)	**Management: Leading & Collaborating in a Competitive World" by Thomas S. Bateman and Scott A. Snell:** • This book emphasizes the importance of leadership and collaboration in today's competitive business world, providing insights into effective management practices.
Recommended books and references (scientific journals, reports...)	**"Good to Great" by Jim Collins:** • Widely used in leadership courses, this book explores the characteristics of companies that have achieved sustained greatness.
Electronic References, Websit	**"Human Resource Management" by Gary Dessler:** • A widely adopted book for human resource management courses, it covers key HR concepts, practices, and challenges faced by organizations. **"The Five Dysfunctions of a Team" by Patrick Lencioni:** • This book is often used to teach principles of teamwork, collaboration, and leadership focusing on identifying and overcoming common challenges.

Course Description Form

1. Course Name:
Physiology I
2. Course Code:
MDER 313
3. Semester / Year:
1st / 2023−2024
4. Description Preparation Date:
12.09.2023
5. Available Attendance Forms:
Attendance, only
6. Number of Credit Hours (Total) / Number of Units (Total)
5 hours / week, total =75hr
7. Course administrator's name (mention all, if more than one name)
Name: Assist. Prof. Dr. Abbas Fadel Email: abbasalhashimi04@nahrainuniv.edu.iq Name: Lecturer Dr. Dunia Tahseen Nema Email: dunia.t.nema@nahrainuniv.edu.iq
8. Course Objectives

Course Objectives	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

9. Teaching and Learning Strategies

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

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	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.	Body Fluids	Lectures Tutorial	Home works Discussio
	3	Practical experiment.	Osmosis	Lab. / practica lecture	Quizzes Report

2	2 3	Edema, case study Practical experiment	Body Fluids Diffusion	Lectures Tutorials Lab. / practical lectu	Home works discussion Quizzes Reports
3	2 3	Introduction about blood RBC (shape and property) Practical experiment	Blood RBC Count	Lectures Video Tutorials Lab. / practical lecture	Home works Discussion Quizzes Reports

4	2 3	The student will be able : To Learn about blood clotting factors ,blood types, methods of transfusion, and matching Practical experiment	Blood Blood Gropi	Lectures Video Tutorials Lab. / practical lecture	Home works discussion Reports Quizzes
5	2 3	The student will be able : To understand the different To identify and distinguish white blood cells, their origin, types and diseases related to them. Practical experiment	Blood Blood coagulant	Lectures Video Tutorials Lab./ practical lecture	Home works Discussion Quizzes Reports

6	2	BLOOD diseases	Blood	Lectures Video Tutorials	Quizzes Home works
	3	Practical experiment	WBC (Shape differentiati)	Lab./ practical lecture	Quizzes Reports
7	2	The student will be able : 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.	Immunity 1	Lectures vidio Tutorials	Quizzes Home works
	3	Practical experiment	WBC accoun	Lab. / practical lecture	Quizzes Reports

8	2 3	The student will be able : To identifying immune bodies, their composition, methods of measurement, and the devices used for this purpose. Practical experiment	Immunity 2 ESR estimation	Lectures Video Tutorials Lab. / practical lecture	Home works discussion Quizzes Reports
9	2 3	 Practical experiment	Body fluid, blood, immunity Methods And device used To measure body immunity	Lectures Lab. / practic lecture	Mid 1 Quizzes Reports

10	2 3	The student will be able : To identify the physiology of muscles and nerves Exam	muscles and nerves	Lectures Tutorials Lab.	Quizzes Home works Practical MID
11	2 3	The student will be able : To understand muscles and nerves Practical experiment	muscles and nerves Other blood experiment	Lectures Tutorials Lab. / practical lecture	Quizzes Home works Quizzes Reports

12	2 3	The student will be able : To understand muscles and nerves Exam	muscles and nerves Other blood experiment	Lectures Tutorials Lab. / practical lecture	Quizzes Home works Practical Mid
13	2 3	The student will be able : To understand muscles and nerves Exam	muscles and nerves Student test Regarding information Theory for course experiments	Lectures Tutorials Lab.	Home works Quizzes Final exar

14	2 3	Practical experiment	muscles and nerves review	Lectures Lab.	Mid2 discussion
15	5	Experience the art of public speaking and conveying information, which gives the student boldness in dealing. In addition, the topics of the various seminars increase the students' scientific information, and through them the student gains experience in researching and investigating information.	Subject abou physiology	Seminar	Presentat n and discussion

2. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc
Mid (20)
Quizzes (5)
Lab. (15) include reports
Final Exam [60 (50 theory +10 practical)]

3. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Principiles of anatomy and physiology, by Gerar Tortora& Bryan H. Derrickson 12PthP Volume 1 2009
Main references (sources)	Text book of medical physiology, by Guton & H eleven ed. 2020.
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

Course Description Form

1. Course Name:
Electronic III
2. Course Code:
MDER315
3. Semester / Year:
first/ third year
4. Description Preparation Date:
12/9/2023
5. Available Attendance Forms:
presence only
6. Number of Credit Hours (Total) / Number of Units (Total)
45 Hours /2
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Jassim Mohammed Sahan Email: jassim.m.sahan@nahrainuniv.edu.iq
8. Course Objectives

Course Objectives	1.Understanding Electronic circuit : understanding of the fundamental principles of electronics, including circuit theory, and electronic circuit characteristics. 2. Circuit Analysis and Design: Acquire the skills to analyze and design electronic circuits, including oscillator, multivibrators, feedback amplifiers, power amp.

9. Teaching and Learning Strategies

Strategy	1.Lecture-based Instruction: Traditional method of delivering content through lectures, where the instructor presents information to students. 2. Active Learning: Engaging students in hands-on activities, discussions, problem-solving exercises, and group work to promote active participation and deeper understanding. 3. Cooperative Learning: Organizing students into small groups to work collaboratively on tasks or projects, fostering teamwork, communication, and critical thinking skills. 4. Inquiry-Based Learning: Encouraging students to ask questions, explore topics independently, conduct research, and discover knowledge through investigation. 5. Problem-Based Learning: Presenting students with real-world problems or scenarios that require critical thinking, analysis, and application of knowledge to find solutions.

10. Course Structure					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
1	3	Understand the principles	negative feedback amplifiers electronic circuits V-Series and V- shunt Feedback	Lectures,	Discussion in the classroom
2	3	Analysis and design	negative feedback amplifiers electronic circuits of c-Series and c- shunt feedback	Lectures, problem-solving exercises,	Quizzes,
3	3	Analysis and design	RC shift and Wien Bridge Oscillators	Lectures, problem-solving exercises,	Discussion in the classroom
4	3	Analysis and design	Phase shift oscillator, Ramp generator, Hartly oscillator, Crystal oscillator	Lectures, problem-solving exercises,	Quizzes,
5	3		Mid Exam 1		written exams
6	3	Understand the principles	power amplifier and classes types	Lectures, demonstrations, hands-on activities	Discussion in the classroom
7	3	Analysis and design	power amplifier, class A,	Lectures, problem-solving exercises,	Quizzes,
8	3	Analysis and design	power amplifier, class B	Lectures, problem-solving exercises,	Discussion in the classroom
9	3	Analysis and design	power amplifier, class AB	Lectures, problem-solving exercises,	Quizzes,
10	3	Analysis and design	power amplifier, class C and class D	Lectures, problem-solving exercises,	Discussion in the classroom
11	3	Analysis and design	Multivibrators: MTV's using transistor, Astable MTV Type	Lectures, problem-solving exercises,	Quizzes,
12	3	Analysis and design	Multivibrators: Monostable MTV type	Lectures, problem-solving exercises,	Discussion in the classroom
13	3	Analysis and design	Multivibrators: MTV's using transistor, Bistable MTV	Lectures, problem-solving exercises,	Quizzes,
14	3		Mid EXAM 2		written exams
15	3		Discussion of the Reports	Presentations	Presentations

11. Course Evaluation
-Tests (Quizzes): (%3): Tests are intended to reinforce and support material discussed in lectures. **-Assignments: (2%):** there will be two assignments throughout the semester. **-Project (5%):** Assign a score out of 5% to evaluate students' performance in projects or case studies related to electronic circuits. **-Examinations:(30%):** The mid-Semester exam is worth 30% of the final grade. **1.Mid-Semester Exam1: (%15):** The mid-semester exam will examine material covered from Week (1) to Week (4). **2.Mid-Semester Exam2: (15%)** The mid-semester exam will examine material covered from (6) to Week (13). **-Final Exam (60%):** The exam is worth 60% of the final grade.

12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Electronic Devices And Circuit Theory,11th Edition, by R. Boylsted.
Main references (sources)	1.Electronic Devices by Floyd 9th edition 2. ."Electronic Principles" by Albert Malvino
Recommended books and references (scientific journals, reports...)	Electronics-Tutorials (www.electronics-tutorials.ws)
Electronic References, Websites	1.Electronics Hub: Provides tutorials, projects, and articles various aspects of electronics, including circuit design, microcontrollers, and embedded systems. (https://www.electronicshub.org/) 2.Circuit Digest: Offers a collection of circuit diagrams, tutorials, and articles on electronics and circuit design. The website covers topics such as Arduino, Raspberry Pi, sensors, and power electronics. (https://circuitdigest.com/)

Course Description Form

1. Course Name:	
Engineering Analysis	
2. Course Code:	
MDER310	
3. Semester / Year:	
First / 2023-2024	
4. Description Preparation Date:	
12.9.2023	
5. Available Attendance Forms:	
Attendance only	
6. Number of Credit Hours (Total) / Number of Units (Total)	
4 hours/week, Total = 60 hours, 3 Units	
7. Course administrator's name (mention all, if more than one name)	
Name: **Dr Hassanain Ali Lafta** Email: **hassanain.a.lafta@nahrainuniv.edu.iq**	
8. Course Objectives	
Course Objectiv	**This course aims to help students how to learn and understand the basic concepts and application of advanced mathematical tools which are necessary to divide an engineering system or a signal into smaller and simpler component or element that describe what beyond each part to do or behave.**
9. Teaching and Learning Strategies	
Strategy	▪ **Understanding of Engineering Analysis: Students should gain a solid understanding of the fundamental concepts of engineering analysis, such as Fourier series, Fourier transform and Laplace transform.** ▪ **Students should be able to analyze and solve problems related to the periodic and aperiodic signals, odd and even functions, and linear time invariant systems.** ▪ **Students should develop a deep understanding of the principles of engineering Fourier and Laplace analysis, including the definition, properties and theorems, and energy. They should be able to apply these principles to analyze and solve problems related to signals and systems in various scenarios.** ▪ **Engineering Application: Students should become familiar with various techniques used for analyzing electrical and mechanical engineering systems.**

10. Course Structure					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
1	**4**	**CLO-1: Understanding of Engineering Analysis: Students should gain a solid understanding of the fundamental concepts of engineering analysis, such as Fourier series, Fourier transform and Laplace transform.**	**Course Description and Introduction**	**Theoretical Lectures and Tutorials**	**Home works, Quizzes and Midterm Exams**
2	**4**	**CLO-2: Students should be able to analyze and solve problems related to the periodic and aperiodic signals, odd and even functions, and linear time invariant systems.**	**Fourier Series Analysis**		
3	**4**		**=**		
4	**4**		**=**		
5	**4**		**=**		
6	**4**		**Midterm Exam 1**		
7	**4**	**CLO-3: Students should develop a deep understanding of the principles of engineering Fourier and Laplace analysis, including the definition, properties and theorems, and energy. They should be able to apply these principles to analyze and solve problems related to signals and systems in various scenarios.**	**Fourier Transform Analysis**		
8	**4**		**=**		
9	**4**		**=**		
10	**4**		**Midterm Exam 2**		
11	**4**		**Laplace Transform Analysis**		
12	**4**	**CLO-4: Engineering Application: Students should become familiar with various techniques used for analyzing electrical and mechanical engineering systems.**	**=**		
13	**4**		**=**		
14	**4**		**=**		
15	**4**		**Review and Preparation to the Final Examination**		

11.Course Evaluation	
Distributing the student's score out of 100 according to the tasks assigned as follows; %40 for Quizzes, Home works and Midterm Exams. %60 for Final Examination.	
12.Learning and Teaching Resources	
Required textbooks (curricular books, if any)	**Advanced Engineering Mathematics, E. Kreyszig, 9th Ed. 2006, John Wylie and Sons Inc.**
Main references (sources)	**Advanced Engineering Mathematics, C. Ray, Wylie and Sons, 6th Ed. 1995, McGraw-Hill.**
Recommended books and references (scientific journals, reports...)	**Advanced Engineering Mathematics, Peter V. O'neil, 7th Ed. 2012, CENGAGE Learning.**
Electronic References, Websites	

Course Description Form

1. Course Name:
2. Course Code: MDER 314
3. Semester / Year: 1st semester \ 3rd year.
4. Description Preparation Date: 12\9\2023
5. Available Attendance Forms: Attendance only.
6. Number of Credit Hours (Total) / Number of Units (Total): 60 hours\3units .
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Eman Ghadhban Khalil Email: eman.g.khalil@nahrainuniv.edu.iq
8. Course Objectives

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

9. Teaching and Learning Strategies

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

10. Course Structure

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

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

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

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

11. Course Evaluation

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

40% (rate of 20% for midterm exam + 5% daily tests + 15% LAB exam with homework & attendance) + **60% final(50%** comprehensive written theoretical exam for the entire subject+10%final LAB exam)

12. Learning and Teaching Resources

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

Course Description Form

1. Course Name:
Medical Equipment I
2. Course Code:
MDER316
3. Semester / Year:
1^{st} semester/ 3^{rd} year
4. Description Preparation Date:
12\9\2023
5. Available Attendance Forms:
Attendance only
6. Number of Credit Hours (Total) / Number of Units (Total)
60 hours in the semester/3 units
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Mais Odai Abdul Rassul AL-Saffar Email: mais.o.abdulrassul@nahrainuniv@edu.iq
8. Course Objectives

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

10. Course Structure

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

11. Course Evaluation

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

20 marks Midterm

15 marks practical

5 marks Quizzes

Final (60%)

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

Course Description Form

1. Course Name:

Trunk Anatomy

2. Course Code:

MDER312

3. Semester / Year:

1st semester /Third year / 2023-2024

4. Description Preparation Date:

12.9.2023

5. Available Attendance Forms:

Attendance, only

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

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

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

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

8. Course Objectives

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

9. Teaching and Learning Strategies

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

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	Thoracic cage organization. & the sternum	Thoracic cage organization. The sternum	Lecture	Homework
2	4	The ribs & thoracic vertebrae	The ribs & thoracic vertebrae	Lecture	Quiz
3	4	Intercostal space Functional anatomy of	Intercostal space Functional anatomy of	Lecture and classroom discussion	Discussion in classroom

		respiration and diaphragm	respiration and diaphragm		
4	4	Pleural cavity, The Mediastinum (Division & sub Division)	Pleural cavity The Mediastinum (Division & sub Division)	Lecture	Quiz
5	4	Study the anatomy of the heart	The Heart	Lecture	Discussion in classroom
6	4	The Abdomen (Anterior abdominal wall)	The Abdomen (Anterior abdominal wall)	Lecture and classroom discussion	Class participation
7	4	An examination of the first sixth lectures	First practical exam	Exam	Mid Term Exam
8	4	The abdominal peritoneal Cavity, Peritoneal Folds, Alimentary Tract	The abdominal peritoneal Cavity, Peritoneal Folds Alimentary Tract	Lecture and classroom discussion	Quiz
9	4	The diaphragm, The Kidnay, suprarenal & ureter	The diaphragm The Kidnay, suprarenal & ureter	Lecture	Class participation
10	4	Posterior abdominal wall, Inguinal Canal, testis & scrotum	Posterior abdominal wall Inguinal Canal, te & scrotum	Lecture	Discussion in the classroom
11	4	An examination of the 8-10 lectures	Second practical exam	Exam	Mid Term Exam
12	4	Boney pelvis, ligaments & sex differences, Muscles and fascia of pelvic walls and floor, Internal pelvic organs: rectum, anal canal, Nerves and vessels of the pelvis, General plane of perineum, Male & female perineum	Pelvic region	Lecture and classroom discussion	Class participation
13	4	Seminars about different diseases related to the topics covered in this course	SEMINARS	Presentations	Presentations

14	4	Final practical exam	Final practical exam	Exam	Practical Exam
15	Preparation for the final exam				

1. Course Evaluation

Attendance (5%) – Quizzes (2.5%) - Assignment (2.5%) - Mid-Term Exam (20%) - Practical Quizzes (2.5%) - Practical Exam (7.5%) - Final practical Exam (10%) - Final Exam (50 %).

2. Learning and Teaching Resources

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

Course Description Form

1. Course Name:

Mechanics of Materials I

2. Course Code:

MDER311

3. Semester / Year:

1st semester/ 3rd year

4. Description Preparation Date:

12/9/2023

5. Available Attendance Forms:

Attendance, only

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

3 hr, 45 hrs total / 2 Units

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

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

8. Course Objectives

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

9. Teaching and Learning Strategies

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

10. Course Structure

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

11.Course Evaluation

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

through feedback on the students. coursework and discussion of the coursework in subsequent lecture/tutorial classes. The examination paper typically has a choice of five questions from a possible six, covering all the learning outcomes.	
12.Learning and Teaching Resources	
Required textbooks (curricular books, if any	Mechanics of Materials, Hearn,2nd edition, Perjan press,1985
Main references (sources)	
Recommended books and references (scientific journals, reports...)	1. Strength of Materials, R. S. Khurmi, 1st editi 1968. 2. Schaum's Outline of Strength of Materials, Na W. and Potter, M., 2011.
Electronic References, Websites	

Course Description Form

1. Course Name:

Experimental Design

2. Course Code:

MDER 317

3. Semester / Year:

2023- 2024/ 3rd

4. Description Preparation Date:

12/ 9/ 2023

5. Available Attendance Forms:

in-person only

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

2 Hours / 1 Units/ total= 30 hr

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

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

8. Course Objectives

Course Objectives	**This course has been designed to introduce the students to the basic theories and techniques that enable them to efficiently assess the effect of multiple inputs, or factors, on measures of performance, or responses.**

9. Teaching and Learning Strategies

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

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2h	Introduction to Experimental Design Models	Experimental Design	**Lectures, Labs and Tutorials**	Assessment is based on hand-in assignments, written exams, Case studies, Quizzes, Labs, seminars, Practical testing, Online testing and final exam.
2	2h	Embedded Systems			
3	2h	Microcontroller			
4	2h	Microprocessor vs. Microcontroller			
5	2h	Digital vs Analog Signal			
6	2h	Introduction to Arduino UNO			
7	2h	Midterm Exam1			
8	2h	Arduino Pins Layout Arduino IDE			
9	2h	I/O Arduino Uno pins			
10	2h	Simulations Programs			

11	2h	Experimental design methods for bioengineering applications			
12	2h	Experimental design methods for bioengineering applications			
13	2h	Midterm Exam2			
14	2h	Biomedical Applications for Experimental Design			
15	2h	Biomedical Applications for Experimental Design			

11.

Tests: (5%)

Assignments: (5%)

Seminar: (10%)

Mid-Semester Exam: (10%)

Lab Sessions: (10%)

Final Exam: (60%)

12.

	Handbook of Biomedical Instrumentation: KHANDPUR, MC GRAW HILL INDI 3rd Revised edition
	Principles of Biomedical Instrumentation, Andrew G. We
	https://en.wikipedia.org/wiki/Design_of_experiments

Signature: hadeel

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

Date: **12/ 9/ 2023**

Course Description Form

Biomaterials 1 / MDER411

1. Course Name:
Biomaterials I
2. Course Code:
MDER411
3. Semester / Year:
2023−2024
4. Description Preparation Date:
24/4/2024
5. Available Attendance Forms:
Attendance only
6. Number of Credit Hours (Total) / Number of Units (Total)
2 hours / weak, total = 30 hr / Number of Units: 2
7. Course administrator's name (mention all, if more than one name)
Name: Dr Alaa Ayyed Jebur Al-Taie Email: alaa.ayyed@nahrainuniv.edu.iq
8. Course Objectives

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

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

9. Teaching and Learning Strategies

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

10. Course Structure

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

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

11. Course Evaluation

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

12. Learning and Teaching Resources

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

Course Description Form

1. Course Name:	
Biomechanics I	
2. Course Code:	
MDER410	
3. Semester / Year:	
1st semester / 4th year	
4. Description Preparation Date:	
1.9.2023	
5. Available Attendance Forms:	
Attendance, only	
6. Number of Credit Hours (Total) / Number of Units (Total)	
5 hours / week, total = 75 hours	
7. Course administrator's name (mention all, if more than one name)	
Name: Dr. Sadiq J. Hamandi, Hamza Abbas Fadhel Email: sadiq.j.abbas@nahrainuniv.edu.iq, hamza.abbas@nahrainuniv.edu.iq	
8. Course Objectives	
Course Objectives	• Describe the scope of scientific inquiry addressed by biomechanists • An understanding the core concepts of mechanics such as mass, force, velocity, acceleration, work, energy, and power and describe the different types of mechanical loads that act on the human body. • Describe the processes involved in the biomechanics of human bone growth and development, human skeletal articulations, and human skeletal muscle • The skills needed to apply the fundamental laws of mechanics such as Newton's laws and conservation of energy to perform quantitative analysis of human body motion and equilibrium. • The ability to practically apply the underpinning theoretical concepts to design experiments and analyze experimental data related to physical activity

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

10. Course Structure

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

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

11. Course Evaluation

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

12. Learning and Teaching Resources

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

Course Description Form

1. Course Name:

Communications

2. Course Code:

MDER412

3. Semester / Year:

1st semester / 4th year

4. Description Preparation Date:

1.9.2023

5. Available Attendance Forms:

Attendance, only

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

6 hours / week, total = 90 hours

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

Name: Dr. Salman Majid Salman
Email: salman.m.salman@nahrainuniv.edu.iq

8. Course Objectives

Course Objectives	• Learn the basics and principles of modern communications (analog and digital).

9. Teaching and Learning Strategies

Strategy	Assessment is based on hand-in assignments, written exam, home works, quizzes, lab reports and lab exam.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Introduction	Introduction	Lectures+Lab	-
2	2	Signals and systems	Signals and systems	Lectures+Lab	-
3	2	Signals and systems	Fourier series and transform	Lectures+Lab	-
4	2	Analog Modulation	AM-1	Lectures+Lab	Home Work

5	2	Analog Modulation	AM-2	Lectures+Lab	Quiz
6	2	Analog Modulation	FM	Lectures+Lab	-
7	2	Analog Modulation	PM	Lectures+Lab	Home Work
8	2	Mid-Exam-1	Mid-Exam-1	Lectures+Lab	Mid-Exam-1
9	2	Noise in communication	Noise in communication	Lectures+Lab	-
10	2	Digital transmission of analog signals	Digital transmission of analog signals-1	Lectures+Lab	Home Work
11	2	Digital transmission of analog signals	Digital transmission of analog signals-2	Lectures+Lab	-
12	2	Probability and information theory	Probability	Lectures+Lab	-
13	2	Probability and information theory	Random variables	Lectures+Lab	Quiz
14	2	Probability and information theory	Information theory	Lectures+Lab	-
15	2	Mid-Exam-2	Mid-Exam-2	Mid-Exam-2	Mid-Exam-2

11. Course Evaluation

Mid Exam 1: 10%
Mid Exam 2: 10%
Home Works and Quizzes: 5%
Lab: 15%
Final Exam: 60%

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	1. Modern Digital and Analog Communication Systems, B.P. Lathi, Zhi Ding
Main references (sources)	1. Schaum's Outline of Analog and Digital Communications, Hwi Hsu
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	

Course Description Form

1. Course Name: Digital Electronic I
2. Course Code:
3. Semester / Year: 1/2023-2024
4. Description Preparation Date:
5. Available Attendance Forms:
Google sheet
6. Number of Credit Hours (Total) / Number of Units (Total)
Lectures (2 hours/week) Tutorials (1 hour/week) Laboratory Sessions (2 hours/week)
7. Course administrator's name (mention all, if more than one name)
Name: Ahmed faeq Email: ahmed.f.hussein@nahrainuniv.edu.iq

8. Course Objectives	
Course Objectives	• Understand the fundamental concepts of digital electronics including numbering systems and Boolean algebra. • Gain proficiency in designing and analyzing circuits using logic gates. • Master the use of Karnaugh maps for simplifying Boolean expressions. • Learn to design and implement combinational logic circuits such as adders, subtractors, multiplexers, demultiplexers, decoders, and encoders. • Develop critical thinking and problem-solving skills throu hands-on and theoretical approaches.
9. Teaching and Learning Strategies	
Strategy	• Active participation in class discussions to clarify doubts and deep understanding. • Regular practice with problem sets and circuit simulations to appl theoretical concepts. • Collaboration with peers on group projects to enhance learning through shared knowledge and skills.

	• Consistent review of lecture notes and recommended readings to reinforce weekly topics.

10. Course Structure

Week	Hours (Lecture/Tutorial/Lab)	Required Learning	Topics	
1	Introduction to Digital Electronics	Basics of electronic systems		
2	Numbering Systems (Binary, Octal, Hexadecimal)	Conversion methods, applications		
3	Boolean Algebra	Laws and Theorems		
4	Logic Gates	Types, symbols, truth tables		
5	Simplification using Boolean Algebra	Simplification techniques		
6	Karnaugh Maps	Mapping and simplification		
7	Combinational Logic: Half and Full Adders	Circuit design and analysis		
8	Combinational Logic: Half and Full Subtractors	Circuit design and analysis		
9	Midterm Review and Exam			
10	Multiplexers	Design and application		
11	Demultiplexers	Design and application		
12	Decoders	Circuit design and applications		
13	Encoders	Circuit design and applications		
14	Revision and Group Project Discussions	Preparation for final exam		
15	Final Exam			

11. Course Evaluation

12. Learning and Teaching Resources

	Microelectronic Circuits by Sedra & Smith (This advanced text provides an in-depth exploration of F and Op-Amps, suitable for students seeking a deeper understanding.)
	Microelectronic Circuits by Sedra & Smith (This advanced text provides an in-depth exploration of F and Op-Amps, suitable for students seeking a deeper understanding.)

Course Description Form

1. Course Name:	
Medical Instrumentation	
2. Course Code:	
MDER 413	
3. Semester / Year:	
1st / 4th Year	
4. Description Preparation Date:	
24.2.2024	
5. Available Attendance Forms:	
Attendance, only	
6. Number of Credit Hours (Total) / Number of Units (Total)	
4 hours / week, total =60 hr	
7. Course administrator's name (mention all, if more than one name)	
Name: Lect. Dr. Samar Ali Jaber Email: samar.a.jaber@nahrainuniv.edu.iq	
8. Course Objectives	
Course Objectives	Lectures and lab session were conducted to teach the students to learn about medical devices in the following aspects: • Technical, design, development aspects • Physiological basis of the human interface with the measurement medical device • Clinical applications • Safety and regulatory environment for those device installation • Maintenance and troubleshooting and possible faults 1.CLO-1: Understanding the principles and fundamentals of medical instrumentation and acquiring knowledge of different types of medical instruments and their applications. 2.CLO-2: Gaining proficiency in the use of medical instruments for measurement of bio signals, monitoring, and analysis of various medical conditions. 3.CLO-3: Developing skills in the calibration, maintenance, and troubleshooting of medical instruments while demonstrating competence in ensuring the accuracy and reliability of medical measurements and data. 4.CLO-4: Familiarity with safety protocols and regulations related to medical instrumentation by applying critical thinking and problem-solving skills to identify and address issues with medical instruments. Developing an understanding of the ethical considerations and legal implications associated with medical instrumentation. 5.CLO-5: Enhancing communication and teamwork skills necessary for effective collaboration with healthcare professionals as well as keeping up to date with advancements in medical technology and staying informed about new developments in the field of medical instrumentation.
9. Teaching and Learning Strategies	

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

10. Course Structure

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

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

11.Course Evaluation

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

12.Learning and Teaching Resources

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

Course Description Form

Thermo-Fluid Mechanics 1 / MDER415

1. Course Name:
Thermo-Fluid Mechanics 1
2. Course Code:
MDER415
3. Semester / Year:
2023-2024
4. Description Preparation Date:
12/9/2023
5. Available Attendance Forms:
Attendance only
6. Number of Credit Hours (Total) / Number of Units (Total)
3 hours / weak, total = 45 hr / Number of Units: 2
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Basma Abdulsahib Faihan Email: basma.a.faihan@nahrainuniv.edu.iq
8. Course Objectives

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

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1-2	6	Understanding general concepts of fluid mechanics	Introduction to fluids mechanics	Lecture	Discussion
3	3	Knowing the general	Fluid properties	Lecture	Quiz

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

11.Course Evaluation

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

12.Learning and Teaching Resources

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

Course Description Form

1. Course Name: **PATHOLOGY**

2. Course Code: MDER 416

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

4. Description Preparation Date: 20\4\2024

5. Available Attendance Forms: Attendance only.

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

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

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

8. Course Objectives

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

9. Teaching and Learning Strategies

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

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

10. Course Structure

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

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

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

11. Course Evaluation

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

40% (rate of 30% for midterm exams + 5% daily tests + 5% seminars)
+
60% final(comprehensive written theoretical exam for the entire subject)

12. Learning and Teaching Resources

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

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

Course Description Form

1. Course Name:
Control I
2. Course Code:
MDER 512
3. Semester / Year:
2023- 2024/ 5th
4. Description Preparation Date:
12/ 9/ 2023
5. Available Attendance Forms:
in-person only
6. Number of Credit Hours (Total) / Number of Units (Total)
3 Hours / 2 Units/ total= 45 hr
7. Course administrator's name (mention all, if more than one name)
Name: Asst.Prof.Dr. Hdaeel Kassim Aljobouri Email: hadeel_bme77@yahoo.com
8. Course Objectives

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

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

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3h	Introduction to Control Systems	Control	**Lectures and Tutorials**	Assessment is based on hand-in assignments, written exams, Case studies, Quizzes, seminars, Practical testing, and Online testing.
2	3h	Open Loop & Closed Loop Control Systems			
3	3h	Transfer Function, Poles & Zeros of System, Stability			
4	3h	Mathematical Modelling of Mechanical Systems			
5	3h	Mathematical Modelling of Electrical Systems			
6	3h	Block Diagrams Representation of a Control System			
7	3h	Midterm Exam1			
8	3h	Signal Flow Graph			

9	3h	Mason's Gain Formula			
10	3h	Transient Response			
11	3h	Transient Response of First Order Systems			
12	3h	Transient Response of Second Order Systems			
13	3h	Midterm Exam2			
14	3h	Routh Herwitz Stability Criterion			
15	3h	Frequency Response Analysis			

11.

Tests: (10%)

Assignments: (10%)

Mid-Semester Exam: (20%)

Final Exam: (60%)

12.

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

Signature: hadeel

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

Date: **12/ 9/ 2023**

Course Description Form

1. Course Name:

Diagnostic Instruments

2. Course Code:

MDER511

3. Semester / Year:

1st / 2023−2024

4. Description Preparation Date:

24.2.2024

5. Available Attendance Forms:

Attendance, only

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

4 hours / week, total =56 hr

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

Name: Asst. Prof. Dr. Auns Q. Al-Neami

Email: Auns.q.hashim@nahrainuniv.edu.iq

8. Course Objectives

The student will be able:

1- To learn the basic concepts of electrical circuits and networks.

2- To understand a basic laws and rules of electrical networks and its fundamentals.

3- To learn the structure and equivalent circuit of the operational amplifier and application in medicine.

4- To recognize the types of electrical voltage and current sources (independent dependent).

5- To describe the transient state in capacitive and inductance networks based on electr theorem.

- .....
- .....
- .....

9. Teaching and Learning Strategies

Strategy	Course is designed to learn the student three principles: 1- Electrical circuits and networks concepts. 2- How to measure the electrical variables voltage, current, resistor pow electrical networks based on electrical methods and theorem. 3- How to recognize the suitable type of electrical sources.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4		Medical Ultrasound	Theoretical scientifi lectures	Oral q during

		1- To learn basic concepts of medic instrumentation system and its differences to the other conventiona system. 2- To learn the objectives, parts, components of ma medical instrumentation systems and in different fields of medicine. 3- To design differ clinical instrumentation system. 4- To learn solvin problem. 5-To describe the block diagram and electronic circuit diagram to prepar for implementatio 6- To simulate sor of the medical sig such as ECG, EEG. 7- To know the principle of work each instrument.				lectu
2	4		Basic Modes of Transmission of Ultrasound	Theoretical scientific lectures	Quiz	
3	4		Pulsed and Continuous, Doppler Ultrasound	Theoretical scientific lectures		Oral duri lect
4	4		Doppler Blood Flow m	scientific interactive me presentations		Quiz
5	4		Ultrasound Imaging Mo Systems	scientific interactive me presentations		hom
6	4		Ultrasound transducer	Theoretical scientific lectures		Quiz
7	4		Multi element Transduc	Theoretical scientific lectures		Oral duri lect
8	4		Echoencephalography	scientific or interactive me presentations		Quiz
9	4		Echocardiography	Theoretical scientific lectures		Exar
10	4		Patient Monitoring Systems, Medical Oscilloscopes, Types o Scopes	scientific or interactive me presentations		Oral duri lect
11	4		Endoscopy, Types of Endoscopes,	Theoretical scientific lectures		quiz
12	4		Capsule Endoscopes	scientific interactive me presentations		quiz
13	4		Monitoring Hardware a certain Circuits.	Theoretical scientific lectures		Oral duri lect
14	4		Monitoring Hardware a certain Circuits.	Theoretical scientific		sem

				lectures	
15	4		Examination		exar

11. Course Evaluation

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

20 marks Midterm

15 marks practical

5 marks Quizzes

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Electrical Technology, B.L. Theraja, A.K. Theraj S.Chand Company, 2014.
Main references (sources)	1. Introduction to the Electrical Circuits by R. Boyles Edithion, 2016. 2. Electrical Technology, B.L. Theraja, A.K. Theraja, vo S.Chand Company, 2014.
Recommended books and references (scientific journals, reports...)	Fundamentals of Electric Circuits, Charles K., Ma 2nd Edition, Tala McGraw-Hill, 2015.
Electronic References, Websites	Research gate

Course Description Form

1. Course Name:
Hospital system and design
2. Course Code:
MDER512
3. Semester / Year:
1st/2024
4. Description Preparation Date:
1/9/2023
5. Available Attendance Forms:
14/4/2024
6. Number of Credit Hours (Total) / Number of Units (Total)
2 hrs./week…… 2 units
7. Course administrator's name (mention all, if more than one name)
Name: ass. Lec. Noor A. Sadek Email: noor.a.sadek@nahrainuniv.edu.iq
8. Course Objectives

Course Objectives	a. Hospital component b. Hospital architecture c. Hospital planning
9. Teaching and Learning Strategies	
Strategy	Lectures +brain Strom+ explanations +discussions.

10. Course Structure

Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
1	2	General knowledge	Hospitals	lectures	Weekly assessments
2	2		Hospitals planning		
3	2		Hospital design		
4	2		patient housing system		
5	2		patient housing system		
6	2		Hospital design		

7 8 9 10 11 12 13 14 15	2 2 2 2 2 2 3		MID TERM -1 Support service system Support service system Medical services department MID TERM -2 Seminars Examination		

11.Course Evaluation

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

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

12.Learning and Teaching Resources

Required textbooks (curricular books, if any)	CODES FOR FEDRAL STANDERS
Main references (sources)	Hospital and Healthcare Facility Design" by Richar L Miller. 2nd edition.
Recommended books and references (scientific journals, reports...)	Springer Scopus Nature
Electronic References, Websites	CODES FOR FEDRAL STANDERS Research Gate Springer

Course Description Form

1. Course Name:
Microprocessor
2. Course Code:
MDER513
3. Semester / Year:
1st semester / 5th year
4. Description Preparation Date:
1.9.2023
5. Available Attendance Forms:
Attendance, only
6. Number of Credit Hours (Total) / Number of Units (Total)
5 hours / week, total = 75 hours
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Salman Majid Salman Email: salman.m.salman@nahrainuniv.edu.iq
8. Course Objectives

Course Objectives	• Learn the basics and principles of microprocessors and microcontrollers. • Learn the use of Arduino platforms (hardware and software). • Discuss some Arduino applications.
9. Teaching and Learning Strategies	
Strategy	Assessment is based on hand-in assignments, written exam, home works, quizzes, lab reports and lab exam.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Microprocessor basics	Introduction to 8085	Lectures+Lab	-
2	2	Microprocessor basics	8085 interfacing	Lectures+Lab	-

3	2	Microprocessor basics	Introduction to 8086	Lectures+Lab	-
4	2	Microcontroller Basics	Introduction to microcontrollers	Lectures+Lab	Home Work
5	2	Arduino Platforms	Introduction to Arduino	Lectures+Lab	Quiz
6	2	Arduino Platforms	Arduino IDE and Fuctions-1	Lectures+Lab	-
7	2	Arduino Platforms	Arduino IDE and Fuctions-2	Lectures+Lab	Home Work
8	2	Mid-Exam-1	Mid-Exam-1	Lectures+Lab	Mid-Exam-1
9	2	Arduino Platforms	Arduino Programming-1	Lectures+Lab	-
10	2	Arduino Platforms	Arduino Programming-2	Lectures+Lab	Home Work
11	2	Arduino Platforms	Arduino Applications-1	Lectures+Lab	-
12	2	Arduino Platforms	Arduino Applications-2	Lectures+Lab	-
13	2	Arduino Platforms	Arduino Applications-3	Lectures+Lab	Quiz
14	2	Arduino Platforms	Arduino Applications-4	Lectures+Lab	-
15	2	Mid-Exam-2	Mid-Exam-2	Mid-Exam-2	Mid-Exam-2

11. Course Evaluation

Mid Exam 1: 10%
Mid Exam 2: 10%
Home Works and Quizzes: 5%
Lab: 15%
Final Exam: 60%

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	
Main references (sources)	1. Arduino I: Getting Started, Steven F. Barrett, 2020 2. Arduino II: Systems, Steven F. Barrett, 2020 3. Arduino III: Internet of Things, Steven F. Barrett, 2021.
Recommended books and references (scientific journals, reports...)	1. Microcontrollers Fundamentals for Engineers and Scientists, Steven F. Barrett and Daniel J. Pack, 2006. 2. Arduino Software Internals: A Complete Guide to How Your Arduino Language and

	Hardware Work Together, Norman Dunbar, 2020
Electronic References, Websites	arduino.cc

Course Description Form

1. Course Name:	
Neural Network	
2. Course Code:	
MDER514	
3. Semester / Year:	
First /2023-2024	
4. Description Preparation Date:	
16/4/2024	
5. Available Attendance Forms:	
presence only	
6. Number of Credit Hours (Total) / Number of Units (Total)	
30 Hours /2	
7. Course administrator's name (mention all, if more than one name)	
Name: Dr. Jassim Mohammed Sahan Email: jassim.m.sahan@nahrainuniv.edu.iq	
8. Course Objectives	
Course Objectives	1. Understand the fundamentals of neural networks: Gain a solid understanding of the ba concepts and principles underlying neural networks, including neurons, activation functi weights, biases, and the feedforward and backpropagation algorithms 2. Explore different neural network architectures: Study and analyze various types of ne network architectures, such as feedforward neural networks, 3. Study the use of neural networks to solve real-world problems: such as image classificatio 4. Learn how to train neural networks to solve problems
9. Teaching and Learning Strategies	
Strategy	1. Lectures and Presentations: Use lectures and presentations to introduce the theoretical concepts, principles, and algorithms of neural networks. Provide clear explanations, visual aids, and examples to enhance understanding. 2.Group Projects: Assign group projects that require students to work collaboratively to solve complex problems using neural networks. 3. Interactive Discussions: Encourage students to share their insights, present different viewpoints, and engage in critical thinking. 4.Assessments and Feedback: Conduct regular assessments, quizzes, and assignments to gauge students' understanding and progress. Provide constructive feedback to guide their learning and address any misconceptions. 5. Stay Updated and Continuous Learning: As an instructor, stay updated with the latest advancements and breakthroughs in neural networks. Share relevant news, articles, and resources with students to foster a culture of continuous learning.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Understanding of princip Biological and Artifi Neuron Model	| Introduction to Neural Networ	Lectures, discussions	class discussion
2	2	Classification of neural network, supervi unsupervised learr methods.	models types of artificial neural,	Lectures, discussions	Quiz,class discussion
3	2	Using feed forward to neural net architecture	feed forward Neural Networks	Lectures, discussions	Quiz,class discussion
4	2	Learn about activation Functions types	Activation functions	Lectures, discussions	Quiz,class discussion
5	2	Learn about Hebb perceptron neural rules in training neural networks	Hebbian, perceptron	Lectures, discussions	Quiz,class discussion
6	2		Mid-exam 1		Writing exam
7	2	Learn about Delta and Winner neural rules in training neural networks	Delta and Winner neural rules	Lectures, discussions	Quiz,class discussion
8	2	Using of Correlation and star neural network learr rules	Correlation and Out star rules	Lectures, discussions	Quiz,class discussion
9	2	Using Perceptron rule in classification application	Perceptron	Lectures, discussions	Quiz,class discussion
10	2	Learn backpropagation and role in training neural	Back propagation Ne Networks	Lectures, discussions	Quiz,class discussion
11	2	Using BSS techniques in biomedical applications	BSS techniques	Lectures, discussions	Quiz,class discussion
12	2	Architecture of ICA algorit	independent component anal ICA network, ICA algorithm,	Lectures, discussions	Quiz,class discussion
13	2	Using ICA and PCA learr rule algorithm in in biomed applications	principle component analysis PCA learning rule, and ICA	Lectures, discussions	Quiz,class discussion
14	2		Mid-exam 2		Writing exam
15	2		Mini -PROJECTE		Presentations

11. Course Evaluation

-Tests(Quizzes): (%3): Tests are intended to reinforce and support material discussed in lectures.

-Assignments: (2%):there will be two assignments throughout the semester.

-mini Project (5%): Assign a score out of 5% to evaluate students' performance in projects or case studies related to neural networks

-Examinations:(30%): The mid-Semester exam is worth 30% of the final grade.

1.Mid-Semester Exam1: (%15): The mid-semester exam will examine material covered from Week (1) to Week (5).

2.Mid-Semester Exam2: (15%) The mid-semester exam will examine material covered from Week (7) to Week (12).

-Final Exam (60%): Final exam will be held during the final examination period. The exam is worth 60% of the final grade.

12. Learning and Teaching Resources	
Required textbooks (curricular books, if an	Fundamentals of Neural Networks - Laurene Faucett
Main references (sourc	Introduction to Artificial Neural Systems by Jacek M. Zurada, (WPC, 1992)
Recommended books and references (scientific journals, reports...)	1. "Deep Learning" by Ian Goodfellow, Yoshua Bengio, and Aaron Courville: 2. "Neural Networks and Deep Learning: A Textbook" by Charu Aggarwal: 3. "Pattern Recognition and Machine Learning" by Christopher Bishop 4. "Deep Learning with Python" by François Chollet:
Electronic References, Websites	Neural Networks and Deep Learning - Michael Nielsen: (http://neuralnetworksanddeeplearning.com/)

Course Description Form

1. Course Name:	
Rehabilitation Engineering	
2. Course Code:	
MDER515	
3. Semester / Year:	
First / 2023-2024	
4. Description Preparation Date:	
28.2.2024	
5. Available Attendance Forms:	
Attendance only	
6. Number of Credit Hours (Total) / Number of Units (Total)	
2 hours/week, Total = 30 hours, 2 Units	
7. Course administrator's name (mention all, if more than one name)	
Name: **Dr Hassanain Ali Lafta** Email: **hassanain.a.lafta@nahrainuniv.edu.iq**	
8. Course Objectives	
Course Objectives	**This course aims to provide knowledge about the basic principles and concepts applied in rehabilitation engineering design and to understand the clinical problems for which rehabilitation engineering and assistive technology are used.**
9. Teaching and Learning Strategies	
Strategy	▪ **Understand the basic principles and concepts applied in rehabilitation engineering design and the clinical problems for which rehabilitation engineering and assistive technology are used.** ▪ **Understand the basic designs and structural components of assistive conventional and smart walkers, manual and electrical wheelchairs and related analyses.** ▪ **Quantitatively describe the functional electrical stimulation FES in terms of its clinical applications, used electrodes, tissue impedance and electrical current modes.** ▪ **Understanding the principles of sensory rehabilitation the hearing and visual systems and their functions assessment, and analyzing the assisted technology used for hearing and visual loss rehabilitation.**

10. Course Structure					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
1	**2**	**CLO-1: Understand the basic principles and concepts applied in rehabilitation engineering design and the clinical problems for which rehabilitation engineering and assistive technology are used.**	**Course Description and Introduction**	**Theoretical Lectures and Presentations**	**Quizzes and Midterm Exams**
2	**2**		**Introduction to Rehabilitation Engineering**		
3	**2**		**=**		
4	**2**	**CLO-2: Understand the basic designs and structural components of assistive conventional and smart walkers, manual and electrical wheelchairs and related analyses.**	**Wheelchairs**		
5	**2**		**=**		
6	**2**		**=**		
7	**2**		**Assistive Walkers**		
8	**2**		**Midterm Exam 1**		
9	**2**		**Assistive Walkers**		
10	**2**	**CLO-3: Quantitatively describe the functional electrical stimulation FES in terms of its clinical applications, used electrodes, tissue impedance and electrical current modes.**	**Functional Electrical Stimulation FES**		
11	**2**		**=**		
12	**2**	**CLO-4: Understanding the principles of sensory rehabilitation the hearing and visual systems and their functions assessment, and analyzing the assisted technology used for hearing and visual loss rehabilitation.**	**Hearing Loss Rehabilitation**		
13	**2**		**=**		
14	**2**		**Midterm Exam 2**		
15	**2**		**Review and Preparation to the Final Examination**		

11.Course Evaluation	
Distributing the student's score out of 100 according to the tasks assigned as follows; %40 for Quizzes and Midterm Exams. %60 for Final Examination.	
12.Learning and Teaching Resources	
Required textbooks (curricular books, if an	**An Introduction to Rehabilitation Engineering, R. Cooper, H. Ohnabe, D. Hobson. 2007, CRC Press.**
Main references (sources)	
Recommended books and references (scientific journals, reports...)	**The Biomedical Engineering Handbook, Joseph D. Bronzino, 4th Ed. 2015, CRC Press.**
Electronic References, Websites	**Relevant Educational You tubes.**

Course Description Form

Biomedical Engineering Department

Mathematics IV

1. Course Name:
Mathematics IV
2. Course Code:
MATH220
3. Semester / Year:
2nd / 2nd year
4. Description Preparation Date:
28/1/2024
5. Available Attendance Forms:
Attendance, only
6. Number of Credit Hours (Total) / Number of Units (Total)
4 hours / week, total =60 hr, Number of Units: 3 units
7. Course administrator's name (mention all, if more than one name)
Name: Lecturer Dr. Ali M. Miftin Email: ali.m.miftin@nahrainuniv.edu.iq
8. Course Objectives

Course Objectives The student will study mathematical theories and application. On completion of this course the student will be able to:	1. Solve problems by vectors 2. Solve problems of vector fields 3. Classify and solve separable, linear and exact differential equations. 4. Set a mathematical model for practical problems such as mechanical vibrations or simple electric circuit RLC
9. Teaching and Learning Strategies	
Strategy	- applying concepts in the real world - problem solving – based leaning strategy - collaborative concept planning

10. Course Structure					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
1	4	A1 B1 C3	Vector Differential Calculus/ -Vectors in 2-Space and 3-Space	Lecture	HW
2	4	A1 B1 C3	- Inner Product (Dot Product) - Vector Product (Cross Product)	Lecture	HW
3	4	A2 B2 C3	Vector and Scalar Functions and Their Fields. Vector Calculus: Derivatives	Lecture	Seminar
4	4	A2 B2 C3	Gradient of a Scalar Field. Directional Derivative -Examples	Lecture	HW Onsight assignment
5	4	A2 B2 C3	Divergence of a Vector Field -Examples	Lecture	HW Quiz
6	4	A2 B2 C3	Curl of a Vector Field -Examples	Lecture	HW
7	4	A2 B2 C3	Vector Integral Calculus. Integral Theorems - Line Integrals	Lecture	HW
8	4	A2 B2 C3	- Path Independence of Line Integrals - Double Integrals	Lecture	HW
9	4		MID EXAM Green's Theorem in the Plane	Lecture	Exam
10	4	A2 B2 C3	-Surface Integrals Triple Integrals. Divergence Theorem of Gauss	Lecture	HW Onsight assignment
11	4	A3 B3 C3	Ordinary Differential Equations of the First Order -Classification of Differential Equations	Lecture	HW
12	4	A3 B3 C3	-Separable First-Order Equations	Lecture	Quiz

			- Homogeneous First-Order Equations		
13	4	A3 B4 C3	-Exact First-Order Equations -Integrating Factors for First-Order Equations	Lecture	HW
14	4	A3 B4 C3	-Second-Order Equations of Reducible Order -Applications of First-Order Differential Equations	Lecture	Seminar
15	4		Linear Differential Equations MID EXAM	Exam	Exam

11.Course Evaluation	
Distributing the score out of 100 according to the tasks assigned: MID EXAMS 30, Homework assignments and quizzes 10, Final Exam 60.	
12.Learning and Teaching Resources	
Required textbooks (curricular books, if ar	Advanced Engineering Mathematics 9th ed. / Kreysziq Advanced Engineering Mathematics 6th ed./ Zill
Main references (sources)	
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	Microsoft Math soft MathCad Autograph

Course Description Form

1. Course Name:
Upper and Lower Limbs Anatomy
2. Course Code:
MDER223
3. Semester / Year:
2nd Semester/ 2nd Year
4. Description Preparation Date:
28/1/2024
5. Available Attendance Forms:
Attendance, only
6. Number of Credit Hours (Total) / Number of Units (Total)
4 hours / week, total =60 hr
7. Course administrator's name (mention all, if more than one name)
Name: Assis. Prof. Dr. Rana I. Mahmood Email: rana.i.mahmood@nahrainuniv.edu.iq
8. Course Objectives

Course Objectives	▪ This course will provide the students with the basic knowledge of human anatomy in the context of macroscopy and microscopic structure, mechanics and function. The focus is on the healthy body, with reference to diseases and ageing. It provides basic biological knowledge in human systems for bioengineering applications.
9. Teaching and Learning Strategies	
Strategy	1. Lectures. 2. Reading methodological and source books and viewing some websites (self-learning). 3. Discussion in the classroom.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	Students should have an introduction to anatomy, terms of description, movement, and know the basic anatomical structures.	Introduction to anatomy, terms of description & movement Basic anatomical structures	Lecture	Homework

2	4	Study the imaging anatomy and sectiona anatomy	Imaging anatomy, sectional anatomy Osteology of shoulder region, joints of shoulder girdle	Lecture	Quiz
3	4	Study the osteology of shoulder region, muscles and joints of shoulder girdle, axilla & brachial plexus	Scapular & shoulder muscles, axilla & brachial plexus	Lecture and classroom discussion	Discussion in the classroom
4	4	Study the arm (bones & muscles), elbow joint, cubital fossa	Arm & elbow joint	Lecture	Quiz
5	4	Study the forearm region (bones, muscles and joints)	The Cubital fossa & forearm	Lecture	Discussion in the classroom
6	4	Study the skeleton & structures of the hand	Wrist & hand	Lecture classroom discussion	Class participation
7	2	An examination of the first sixth lectures	Mid-Term Theoretical Exam	Exam	Mid Term Exam
8	4	Study the gluteal region, its skeleton and muscles	The gluteal region	Lecture classroom discussion	Quiz
9	4	Study the hip joint & the thigh (bone & muscles)	The hip joint &osteology of femur, the thigh	Lecture	Class participation
10	4	Study the knee joint & popliteal fossa, the leg &its compartments, venous system of lower limb	Knee joint & popliteal fossa, the leg &its compartments, venous system of lower limb	Lecture	Discussion in the classroom
11	4	Study the knee joint & popliteal fossa, the leg &its compartments, venous system of lower limb	Ankle joint & arches of the foot, the foot, nerve injuries of lower limb	Lecture classroom discussion	Quiz
12	2	An examination of 7- 11 lectures	Mid – Term Theoretical Exam	Exam	Mid Term Exam
13	4	Seminars about different diseases related to the topics covered in this course	Seminars	Presentations	Presentations
14	1	Final practical exam	Final Practical Exam	Exam	Practical Exam

15	Preparation for the final exam

11. Course Evaluation	
Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc	
12.Learning and Teaching Resources	
Required textbooks (curricular books, if any)	**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.
Main references (sources)	**1.** Tortora G. J. Principles of Human Anatomy, tenth edition; 2005.
Recommended books and references (scientific journals, reports...)	Snell R. S. (1976). An Atlas of Nor Radiographic Anatomy, first edition.3
Electronic References, Websites	https://www.kenhub.com/

Course Description Form

Optical System Design

1. Course Name:	
Optical System Design	
2. Course Code:	
MDER225	
3. Semester / Year:	
second/second year	
4. Description Preparation Date:	
28/1/2024	
5. Available Attendance Forms:	
presence only	
6. Number of Credit Hours (Total) / Number of Units (Total)	
30 Hours /2 units	
7. Course administrator's name (mention all, if more than one name)	
Name: Dr. Jassim Mohammed Sahan Email: jassim.m.sahan@nahrainuniv.edu.iq	
8. Course Objectives	
Course Objectives	1. Understand the fundamental principles of optics, including geometric and wave optics, and their relevance to optical system design. 2.Analyze and evaluate the performance of optical systems 3. Understand the optical materials for achieving desired system performance. 4. Understand of design optical systems.
9. Teaching and Learning Strategies	
Strategy	1.Lecture-Based Learning: Traditional lectures can provide a foundational understanding of optical principles, theories, and design methodologies. 2.Problem-Based Learning (PBL): PBL involves presenting students with real-world optical design problems , allowing them to apply their knowledge and problem-solving skills to find solutions. 3. Project-Based Learning : project-based learning involve students working on mini projects or case studies related to optical system design.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Understand fundamentals of optical	Optics overview	Lectures	Homework
2	2	Understand fundamentals of geometric optics	Ray Geometric Optics	Lectures, Problem-solving exercises	Quiz, Homework,
3	2	Design and analyze lens systems and Eyepieces	Spherical thin lens	Lectures, Problem-solving exercises	Quiz, Homework,
4	2	Learn about Multi-Lens Design system	Multi-Lens optical	Lectures, exercises	Homework
5		Learn about optical Human Eye.	The optical system the human eye	Lectures, Problem-solving exercises	Quiz, Homework,
6	2		Mid exam1		Written Exam
7	2	Design and analyze Prism and Mirror systems	Prism and Mirror Systems,	Lectures,	Homework
8	2	Learn about optical materials	Optical Materials,	Lectures,exercises	Homework
9	2	Learn about optical Design and analyze 0f Optical Sensor	Optical Sensor Systems	Lectures,exercises	Quiz, Homework
10	2		Mid exam2		Written Exam
11	2	Fundamental OF	Optical fiber	Lectures,exercises	Quiz, Homework
12	2	Analyze 0f Optical fiber	Optical fiber constructure	Lectures,exercises	Quiz, Homework
13	2	specific applications of optics devices	Biomedical optics devices	Lectures,exercises	Quiz, Homework
14	2	optics devices	Report	Teams Study, group discussions	Presentation,
15	2	Review the end of course			

11. Course Evaluation

Distributing the score out of 100% according to the tasks assigned to the student such as:

Quizzes 3%
Assignments 2%
Report 5%
Written Midterm Exam1 15%
Writing Midterm Exam2 15%
Final Exam 60%

12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	
Main references (sources)	1. Modern Optical Engineering By Warren J. Smith .2"Optical System Design" by Robert Fischer, Biljana Tadic-Galeb, and Paul Yoder 3 "Practical Optical System Layout: And Use of Stock Lenses" by Warren J. Smith 4 "Modern Optical Engineering: The Design of Optical Systems" by Warren J. Smith and Julian Cheng 5 "Optical System Design" by Robert E. Fischer and Biljana Tadic-Galeb
Recommended books and references (scientific journals, reports...)	1."Introduction to Lens Design: With Practical Zemax Examples" by Joseph M. Geary 2."Optical System Design" by Robert F. Smythe 3."Introduction to Modern Optics" by Grant R. Fowles
Electronic References, Websites	Optical Design and Engineering Resources by Edmund Optics:www.edmundoptics.com/resources/optic optical-design-and-engineering

Course Description Form

1. Course Name:
Electrical Networks
2. Course Code:
MDER224
3. Semester / Year:
2nd / second year
4. Description Preparation Date:
28/01/2024
5. Available Attendance Forms:
Attendance only
6. Number of Credit Hours (Total) / Number of Units (Total)
30 hours total, 2 hours per week / 2 Units
7. Course administrator's name (mention all, if more than one name)
Name: Asst. Lect. Ahmed Lateef Khudarahm Email: ahmed.lateef771@nahrainuniv.edu.iq
8. Course Objectives

Course Objectives	The Electrical Networks course provides a comprehensive study of the fundamental principles and analysis techniques essential to understanding electrical circuits. Through a blend of theoretical concepts and practical applications, students explore the behavior of passive and active components within electrical networks. Topics include Ohm's Law, Kirchhoff's Laws, transient analysis, capacitor and inductor behavior and effect on the electrical circuits. Adding to that the two-port network analysis to understand the impedance and other port parameters in the network preparing students for understanding the detailed behavior of the electrical network.

9. Teaching and Learning Strategies

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

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	-Understanding the behavior of RC and RL networks. -Analyzing the effect of circuits parts consisting of coils, capacitors, resistors.	Introduction to Transient Networks	-Lectures -Books	-Home works -Quizzes, -Mid-Terms
2	2		Transients in Capacitive Networks : The Charging Phase		
3	2		Transients in Capacitive Networks : The Discharging Phase		
4	2		Initial Conditions and Instantaneous Values		
5	2	-Analyzing the two port networks with	Thevenin Equivalent in RC Networks		

6	2	its parameters such as impedance, admittance, etc.	Capacitors in Series and Parallel, Energy Stored by a Capacitor		
7	2		Mid-Term Examination 1		
8	2		Pulse Waveform and the RC Respons		
9	2		RC Response to Square Wave Inputs		
10	2		Transients in Inductive Networks : The Storage Phase		
11	2		Transients in Inductive Networks : The Release Phase		
12	2		Thevenin Equivalent in RL Networks		
13	2		Inductors in Series and Parallel, Energy Stored by an Inductor		
14	2		TwoPort Networks		
15	2		Mid-Term Examination 2		

11. Course Evaluation

Home works : 5%
Quizzes : 5%
Mid-Terms : 30%
Final Examination : 60%

12.Learning and Teaching Resources

Required textbooks (curricular books, if any)	
Main references (sources)	-Introductory Circuit Analysis_Boylested_11th -Fundamentals of Electric Circuits_ Charles K.Alexander_5th
Recommended books and references (scientific journals, reports...)	- Textbook of Electrical Technology_Theraja
Electronic References, Websites	www.udemy.com/course/dc-electric-circuits/

Course Description Form

1. Course Name:
Electromagnetic Fields
2. Course Code:
MDER222
3. Semester / Year:
2nd semester / 2nd year
4. Description Preparation Date:
2024/1/28
5. Available Attendance Forms:
Attendance, only
6. Number of Credit Hours (Total) / Number of Units (Total)
2 hours / week, total = 30 hours/2 unit
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Salman Majid Salman Email: salman.m.salman@nahrainuniv.edu.iq
8. Course Objectives

Course Objectives	• Describe and explain mathematical relations of electromagnetic fields with some medical applications.

9. Teaching and Learning Strategies

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

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Course pre-requirements	Introduction	Lectures	-
2	2	Summary about electric fields laws	Coulomb's Law and Electric Field Intensity-1	Lectures	-
3	2	Summary about electric fields laws	Coulomb's Law and Electric Field Intensity-2	Lectures	-

4	2	Summary about electric fields laws	Electric Flux Density-1	Lectures	Home Work
5	2	Summary about electric fields laws	Electric Flux Density-2	Lectures	Quiz
6	2	Summary about electric fields laws	Energy and Potential-1	Lectures	-
7	2	Summary about electric fields laws	Energy and Potential-1	Lectures	Home Work
8	2	Mid-Exam-1	Mid-Exam-1	Mid-Exam-1	Mid-Exam-1
9	2	Summary about electric current and materials	Electric Current Density and Materials-1	Lectures	-
10	2	Summary about electric current and materials	Electric Current Density and Materials-2	Lectures	Home Work
11	2	Summary about magnetic fields laws	Static Magnetic Field-1	Lectures	-
12	2	Summary about magnetic fields laws	Static Magnetic Field-2	Lectures	-
13	2	Summary about magnetic fields laws	Magnetic Force and Materials-1	Lectures	Quiz
14	2	Summary about magnetic fields laws	Magnetic Force and Materials-2	Lectures	-
15	2	Mid-Exam-2	Mid-Exam-2	Mid-Exam-2	Mid-Exam-2

11.Course Evaluation

Mid Exam 1: 12.5%
Mid Exam 2: 12.5%
Home Works and Quizzes: 15%
Final Exam: 60%

12.Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Engineering Electromagnetics, William Hayt, John Buck, 8th Edition
Main references (sources)	Schaum's Outline of Electromagnetics, Joseph Edminister, 2nd Edition
Recommended books and references (scientific journals, reports...)	Electromagnetics, John D. Kraus, 2nd Edition
Electronic References, Websites	

Course Description Form

1. Course Name:
Electronic II
2. Course Code:
MDER221
3. Semester / Year:
Second/ second year
4. Description Preparation Date:
28/1/2024
5. Available Attendance Forms:
Attendance only
6. Number of Credit Hours (Total) / Number of Units (Total)
Lectures (2 hours/week), Tutorials (1 hour/week) Laboratory Sessions (2 hours/week)/3 units
7. Course administrator's name (mention all, if more than one name)
Name: Ahmed faeq Email: ahmed.f.hussein@nahrainuniv.edu.iq
8. Course Objectives

Course Objectives	• Gain a comprehensive understanding of Field-Effect Transistors (FETs), including their structure, operating principles, and different types (JFET & MOSFET). • Analyze the DC characteristics of JFETs and MOSFETs, applying appropriate biasing techniques for optimal performance. • Utilize small-signal AC models for FETs to analyze their frequency response and gain characteristics in amplifier circuits. • Design and analyze single-stage common-source amplifiers using both JFETs and MOSFETs. • Understand the basic principles of Operational Amplifiers (Op-Amps), their ideal characteristics, and key parameters like gain and CMRR. • Apply Op-Amps in various circuit configurations like inverting and non-inverting amplifiers, comparators, integrators, and differentiators. • Analyze the impact of feedback in Op-Amp circuits on stability and performance. • Reinforce theoretical concepts through practical experience in laboratory experiments, focusing on FET and Op-Amp circuits. • Develop strong technical communication skills through clear and conc laboratory reports.

9. Teaching and Learning Strategies	
Strategy	• **Active participation in lectures:** Engage in discussions, ask questions, and actively participate in problem-solving activities presented during lectures.

	• **Thorough review of textbook materials:** Diligently study the assigned textbook chapters before and after lectures to solidify your understanding of the concepts. • **Attending tutorials:** Utilize the tutorial sessions to clarify any doubts arising from lectures, solve practice problems under the guidance of the instructor, and gain a deeper understanding of complex topics. • **Effective laboratory participation:** Actively participate in the laboratory sessions, meticulously follow the provided instructions, record data accurately, and analyze the results to draw meaningful conclusions. • **Completing laboratory reports:** Write clear and concise laboratory reports that document your experimental procedures, data analysis, and interpretations. • **Independent learning:** Utilize online resources, additional textbooks, or relevant articles to supplement your learning and explore topics in greater depth. • **Collaborative learning:** Form study groups with your peers to discuss course materials, solve problems collaboratively, and enhance your learning through peer interaction.

10. Course Structure

Week	Hours (Lecture/Tutorial/Lab)	Required Learning	Topics	Evaluation
1 (Intro)	3 (2/1/0)	Review of BJTs	Recap of BJT biasing & analysis	-
2	3 (2/1/0)	Introduction to Field-Effect Transistors (FETs)	JFET & MOSFET structures, depletion & enhancement modes	-
3	3 (2/1/0)	DC Analysis of JFETs	Transfer & Drain characteristics, Biasing techniques (fixed & self-bias)	-
4	3 (2/1/0)	DC Analysis of MOSFETs	Threshold voltage, Transfer & Drain characteristics, Biasing techniques	-
5	3 (2/1/0)	AC Analysis of FETs	Small-signal models (transconductance), Gain calculations	-
6	3 (2/1/0)	Frequency Response of FET Amplifiers	Bandwidth considerations, Miller effect	-
7	3 (2/1/0)	FET Amplifier Design	Single-stage common-source amplifiers (JFET & MOSFET)	-
8 (Midterm)	3 (2/1/0)	-	Review of FET concepts	Midterm Exam (30%)
9	3 (2/1/0)	Introduction to Operational Amplifiers (Op-Amps)	Ideal Op-Amp characteristics, Differential gain & Common mode rejection ratio (CMRR)	-

10	3 (2/1/0)	Basic Op-Amp Circuits	Inverting & Non-inverting amplifier configurations	-
11	3 (2/1/0)	Op-Amp Applications	Comparators, Differentiators, Integrators	-
12	3 (2/1/0)	Feedback in Op-Amp Circuits	Positive & Negative feedback, Stability considerations	-
13	2 (Lecture)/1 (Lab Report Review)	Laboratory Reports 1 & 2	Review of Labs 1 & 2, Lab Report Preparation Techniques	Lab Reports (20%)
14	0 (Lecture)/0 (Tutorial)/5 (Lab)	None	Laboratory Experiments (e.g., FET characteristics, Op-Amp circuits)	-
15	3 (2/1/0)	None	Course Review, Q&A Session	-

11.Course Evaluation	
12.Learning and Teaching Resources	
Required textbooks (curricular books, if an	Electronic Devices and Circuit Theory by Robert L. Boylestad and Louis Nashelsky (This is a widely used textbook that covers the core topics of this course in a comprehensive and student-friendly manner.)
Main references (sources)	Microelectronic Circuits by Adel S. Sedra and Kenneth C. Smith (This is a more advanced textbook that offers a deeper dive into electronic devices and circuits, particularly suitable for students seeking a more rigorous understanding.)

Course Description Form

1. Course Name:	
Introduction to BME	
2. Course Code:	
MDER 226	
3. Semester / Year:	
2nd / 4th Year	
4. Description Preparation Date:	
28/1/2024	
5. Available Attendance Forms:	
Attendance, only	
6. Number of Credit Hours (Total) / Number of Units (Total)	
2 hours / week, total =30 hr /2 units	
7. Course administrator's name (mention all, if more than one name)	
Name: Lect. Dr. Samar Ali Jaber Email: samar.a.jaber@nahrainuniv.edu.iq	
8. Course Objectives	
Course Objectives	The lectures were conducted to address all the different roles that the biomedical engineer can have in the life cycle of the technology, from research and development, and innovation, mainly undertaken in academia; the regulation of devices entering the market; the assessment or evaluation in selecting and prioritizing medical devices (usually at national level); to the role they play in the management of devices from selection and procurement, to safe use in health-care facilities. In addition, the students will be subjected with current issues in the healthcare system to be analyzed and offer suggested solutions according to advanced international healthcare systems. 1. CLO-1: Understanding the interdisciplinary nature of biomedical engineering: Students gain an appreciation for the integration of principles from various fields, such as biology, medicine, engineering, and physics, in biomedical engineering. 2. CLO-2: Regulatory Compliance and Ethical Considerations: Graduates should be aware of the regulatory frameworks and standards governing the development and use of medical devices and technologies. They should also have a strong understanding of ethical considerations, including patient privacy, informed consent, and the responsible use of biomedical technologies. 3. CLO-3: Research skills: Students may develop research skills through exposure to ongoing research in the field and by engaging in independent or collaborative research projects. This includes literature review, experimental design, data analysis, and interpretation. 4. CLO-4: Awareness of industry and career opportunities: Students gain insights into the diverse career paths available in the field of biomedical engineering, including academic research, industry, healthcare institutions, regulatory agencies, and entrepreneurship. 5. CLO-5: Familiarity with healthcare technologies: Students develop an understanding of the design, development, and application of medical devices, diagnostic tools, prosthetics, and therapeutic systems used in healthcare settings.

9. Teaching and Learning Strategies

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

10. Course Structure

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

11.Course Evaluation

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

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

Course Description Form

Engineering Mechanics II

1. Course Name:	
Engineering Mechanics II	
2. Course Code:	
MDER220	
3. Semester / Year:	
2nd semester/ 2nd year	
4. Description Preparation Date:	
2024/1/28	
5. Available Attendance Forms:	
Attendance, only	
6. Number of Credit Hours (Total) / Number of Units (Total)	
4 hr/ 3 Units	
7. Course administrator's name (mention all, if more than one name)	
Name: Dr Aseel Mohammed Ali Hussein Email: aseel.m.ali@nahrainuniv.edu.iq	
8. Course Objectives	
Course Objectives	Study of plane motion and force systems on particle, system of particles and rigid bodies. It will be an overview of the application of Newton's Laws to rectilinear and curvilinear motions. Work-energy principle, and impulse-momentum, will also be studied.
9. Teaching and Learning Strategies	
Strategy	Lectures supported by modes developing material covered in lectures. These modes include problem-solving tutorials

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1-2	6	Locate the centroid of composite bodies	Center of mass	Lecture & HW	
3-4	8	Calculate the moment of inertia for a given body and axes.	Area moment of inertia	Lecture & HW	Assignment
5	2		Semester Examination 1		
6	4	Be able to relate the velocity and acceleration of points in a rigid body using either absolute motion approaches.	Introduction to dynamics	Lecture & HW	Assignment
7	4	Be able to calculate the velocity and acceleration of a particle in rectangular, polar, and normal and tangential coordinates.	Kinematics of particles: rectilinear motion	Lecture	
8-9	8	Be able to demonstrate the concept of rotating axes in solving problems where motion is observed from a rotating coordinate system.	Plane curvilinear motion	Lecture & HW	Assignment
10	4	Be able to demonstrate the concept of	normal and	Lecture	

		rotating axes in solving problems where motion is observed from a rotating coordinate system.	tangential coordinates	& HW	
11	2		Semester Examination 2		
12-13	8	Be able to relate the velocity and acceleration of points in a rigid body using relative motion approaches.	relative motion	Lecture & HW	
14-15	8	Be able to construct free-body diagrams and kinetic diagrams and learn their importance in dynamics.	Kinetics of particles: Newt second law	Lecture	

11. Course Evaluation

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

12. Learning and Teaching Resources

Required textbo (curricular books, if ar	Engineering Mechanics – Volume 1 Statics + Volume 2 Dynamics, J. L. Meriam & L. G. Kraige, 4th edition, John Wiley & Sons Inc., 1988
Main references (sourc	
Recommended books and references (scientific journals, reports...)	1. J. L. Meriam and L. G. Kraige, Engineering Mechanics, Vol. I – Statics, Vol. II – Dynamics, 5th Ed., John Wiley, 2002. 2. J. L. Meriam and L. G. Kraige, Engineering Mechanics, Vol. I – Statics, Vol. II – Dynamics, 7th Ed., John Wiley, 2006.
Electronic References, Websites	

Course Description Form

1. Course Name:
Democracy
2. Course Code:
UREQ220
3. Semester / Year:
2nd / second
4. Description Preparation Date:
2024/1/28
5. Available Attendance Forms:
Attendance, only
6. Number of Credit Hours (Total) / Number of Units (Total)
1 hours / week, total =15 hr/ 1 unit
7. Course administrator's name (mention all, if more than one name)
Name: Khola jabar mohamed Email: kholaa2020@nahrainuniv.edu.iq

8. Course Objectives	
Course Objectives	1. Understanding Democracy: The module aims to familiarize students with the concept of human rights, their historical development, and the international legal framework governing human rights. It explores the fundamental principles, such as universality, indivisibility, and interdependence of human rights, as well as various international human rights instruments and institutions. 2. Exploring Democracy: The module aims to analyze the theory and practice of democracy, including its different forms, such as liberal democracy, participatory democracy, and deliberative democracy. It examines the core principles of democracy, such as political participation, representation, rule of law, and accountability.

9. Teaching and Learning Strategies	
Strategy	1. Promote critical thinking: Encourage students to question and analyze different perspectives and ideologies related to human rights and democracy. Teach them to think critically about social, political, and economic issues and to evaluate information and sources. 2. Use case studies: Engage students through real-life case studies that highlight the significance of human rights and democracy. These case studies can include historical events, contemporary issues, or personal stories that exemplify the principles and challenges of human rights and democracy.

10. Course Structure					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	**Understanding of Human Rights:** • Define and articulate the fundamental concepts and principles of human rights. • Analyze the historical development and evolution of human rights. **Democracy Concepts:** • Explain the principles and components of democratic governance. • Analyze different forms of democracy and their applications globally. **International Legal Framework:** • Familiarity with key international human rights treaties and conventions. • Understand the role of international organizations and bodies in promoting and protecting human rights.	Democracy: Foundations and Principles" "Democracy and Human Rights Studies" "Global Governance: Democracy" "Contemporary Issues in Human Rights and Democracy" "Law and Politics of Human Rights and Democracy" "Democratic Governance and Advocacy" "International Perspectives on Human Rights and Democracy" Democratic Societies" "Rights-Based Democracy: Theory and Practice" "Social Justice, Democracy, and Human Rights" "Comparative Politics: Human Rights and Democracy" "Ethics and Citizenship: Human Rights in a Democratic Society"	**Interactive Lectures:** • Engage students in interactive lectures that encourage questions, discussions, and critical thinking. • Use multimedia resources to present case studies, real-world examples, and historical contexts. **Case-Based Learning:** • Integrate case studies to analyze the application of human rights and democratic principles in specific situations. • Encourage students to discuss and debate solutions to real-world challenges. **Problem-Based Learning:** • Pose real-world problems related to human rights and democracy for students to solve collaboratively. • Foster critical thinking and application of theoretical knowledge to practical scenarios. **Simulations and Role-Playing:** • Conduct simulations and role-playing	**Essays and Research Papers:** • Assign essays or research papers on specific human rights issues, democratic processes, or the intersection of the two. • Evaluate students' ability to conduct in-depth research, critically analyze information, and communicate effectively. **Case Studies Analysis:** • Require students to analyze and provide solutions to real-world case studies related to human rights and democracy. • Assess their ability to apply theoretical knowledge to practical situations. **Exams and Quizzes:** • Use traditional exams or quizzes to assess knowledge of foundational concepts, theories, and key historical events. • Include multiple-choice, short-answer, and essay questions. **Debates and Presentations:** • Organize

				exercises to allow students to experience and understand complex human rights and democratic processes. • Promote empathy by assigning roles representing different perspectives and stakeholders. **Guest Speakers and Panels:** • Invite experts, activists, and professionals working in the field of human rights and democracy to share their experiences. • Organize panel discussions to expose students to diverse viewpoints and practical insights. **Experiential Learning:** • Facilitate internships, field visits, or community engagement projects to provide students with hands-on experience. • Connect theoretical concepts with real-world applications. **Collaborative Projects:** • Assign group projects that require collaboration, research, and the application of human rights and democratic principles. • Develop	debates on controversial human rights and democracy topics or have students present their research findings. • Evaluate their ability to articulate and defend their viewpoints, as well as engage in constructive dialogue. **Policy Analysis:** • Assign projects where students analyze the impact of policies on human rights and democratic governance. • Evaluate their understanding of policy implications and their ability to propose relevant recommendations. **Group Projects:** • Implement collaborative projects that require teamwork, research, and the application of human rights and democratic principles. • Assess individual contributions and the effectiveness of group work. **Reflective Journals:** • Have students maintain reflective journals throughout the course, expressing personal

				teamwork skills and encourage diverse perspectives. **Critical Reflection:** • Incorporate reflective assignments to encourage students to critically analyze their own beliefs, biases, and values. • Connect personal experiences with course content for deeper understanding. **Debates and Discussions:** • Organize debates on controversial topics related to human rights and democracy. • Foster a respectful environment for open discussions, allowing students to express and defend their viewpoints. **Research and Writing Assignments:** • Assign research papers on specific human rights issues or democratic processes. • Develop students' research and analytical skills while deepening their understanding of the subject. **Online Learning Platforms:** • Utilize online platforms for discussions,	growth, evolving perspectives, and insights gained. • Evaluate their ability to critically reflect on their learning experiences. **Simulations and Role-Playing Assessments:** • Assess students' understanding of human rights and democracy through simulations or role-playing activities. • Evaluate their ability to apply theoretical knowledge in practical scenarios. **Community Engagement and Action Projects:** • Evaluate students based on their participation in community engagement projects or actions that promote human rights and democracy. • Assess their ability to apply knowledge in real-world settings. **Online Assessments:** • Utilize online platforms for quizzes, discussion forums, and interactive assignments. • Incorporate technology for assessment to enhance accessibility and

				quizzes, and multimedia resources to enhance accessibility and engagement. • Encourage asynchronous discussions to accommodate diverse schedules. **Assessment through Action:** • Design assessments that require students to propose actionable solutions to human rights and democracy challenges. • Emphasize the practical application of knowledge.	engagement. **Critical Analysis of Media and Literature:** • Assign projects that require students to critically analyze media representations or literature related to human rights and democracy. • Evaluate their ability to assess information critically and consider multiple perspectives. **Peer Assessment:** • Integrate peer assessments for group projects, presentations, or collaborative activities. • Encourage students to provide constructive feedback on their peers' contributions.

11.Course Evaluation

Surveys:

- Develop a comprehensive survey that covers different aspects of the course, including content, teaching methods, and assessments.
- Include both closed-ended questions (e.g., Likert scale) and open-ended questions for qualitative feedback.

Learning Objectives:

- Assess the extent to which the course's learning objectives were achieved.
- Seek feedback on the clarity and relevance of the learning outcomes.

12.Learning and Teaching Resources

Required textbooks (curricular books, if any)	"The International Human Rights System: Origins, Development, and Impact" by Rhona K. M. Smith • Provides an overview of the historical development and impact of the international human rights system. "Democracy: A Very Short Introduction" by Bernard Crick • Offers a concise introduction to the concept of democracy, its history, and its challenges. "International Human Rights in Context: Law, Politics, Morals" by Henry J. Steiner, Philip Alston, and Ryan Goodman
Main references (sources)	Academic Journals: • Journals like the "Journal of Human Rights," "Human Rights Quarterly," and "Democratization" publish peer-

	reviewed articles on various aspects of human rights and democracy. International Organizations: • Refer to reports and publications from organizations like the United Nations (UN), Amnesty International, and Human Rights Watch for in-depth information on global human rights issues.
Recommended books and references (scientific journals, reports...)	United Nations Human Rights Council Reports • Access reports on various human rights issues globally. The OHCHR website is a valuable resource. World Report by Human Rights Watch • Human Rights Watch publishes an annual report highlighting human rights practices around the world.
Electronic References, Websites	**Universal Declaration of Human Rights** - The official text of the Universal Declaration of Human Rights. **International Covenant on Civil and Political Rights** - Full text of the ICCPR, a key international human rights treaty. Amnesty International - A global movement advocating for human rights, providing reports, campaigns, and resources.

Course Description Form

1. Course Name:

SATISTIC

2. Course Code:

CREQ320

3. Semester / Year:

2nd / 2023-2024

4. Description Preparation Date:

28.1.2024

5. Available Attendance Forms:

Attendance, only

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

3 hours / week, total =45 hr

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

Name: Assis. Prof. Dr. Sufian M. Salih
Email: sufian.m.salih@nahrainuniv.edu.iq

8. Course Objectives

Course Objectives

Objectives of the statistics course can vary depending on the educational level and specific curriculum. However, here are some general objectives that are often associated with a statistics course:

Understanding Basic Concepts:

- Define and comprehend fundamental statistical terms and concepts such as mean, median, mode, standard deviation, variance, probability, etc.

Data Collection and Organization:

- Learn techniques for collecting, organizing, and summarizing data.
- Understand the importance of data quality and the implications of biased or incomplete data.

Descriptive Statistics:

- Apply descriptive statistical methods to summarize and present data effectively.
- Create and interpret graphical representations of data, such as histograms, box plots, and scatterplots.

Inferential Statistics:

- Gain proficiency in making inferences about populations based on sample data.
- Understand hypothesis testing, confidence intervals, and p-values.

Probability Theory:

- Develop a foundational understanding of probability theory and its application in statistical analysis.

Regression Analysis:

- Learn regression analysis to model relationships between variables and make predictions.

Statistical Software:

- Acquire practical skills in using statistical software tools for data analysis, such as R, Python, or statistical packages like SPSS.

Critical Thinking and Problem Solving:

- Enhance critical thinking skills by applying statistical methods to real-world problems.
- Interpret and critically evaluate statistical studies and research findings.

Ethical Considerations:

	• Understand the ethical implications of statistical analysis, including issues related to data privacy and integrity. **Communication Skills:** • Effectively communicate statistical findings through written reports, visualizations, and presentations. • Interpret and understand statistical information presented by others.

9. Teaching and Learning Strategies

Strategy	**Interactive Lectures:** • Engage students in interactive lectures where the instructor involves them through questions, discussions, and problem-solving activities. **Hands-on Activities:** • Provide hands-on activities and practical examples to help students apply statistical concepts to real-world situations. **Technology Integration:** • Incorporate statistical software (e.g., R, Python, Excel) to allow students to perform data analysis and visualize results, providing practical skills for future use.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15	3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	**Basic Concepts:** • Define and explain fundamental statistical terms and concepts. • Differentiate between descriptive and inferential statistics. **Data Representation:** • Interpret and create various graphical representations of data (e.g., histograms, box plots, scatterplots). **Probability and Distributions:** • Understand basic probability concepts and probability distributions. **Inferential Statistics:** • Apply inferential statistical techniques, including hypothesis testing and confidence interval estimation.	**Week 1-2: Introduction to Statistics** **Overview:** • Define statistics and its importance. • Introduce basic statistical terms and concepts. **Topics:** • Descriptive vs. inferential statistics. • Types of data (nominal, ordinal, interval, ratio). • Measures of central tendency (mean, median, mode). **Activities:** • Interactive lectures. • Group discussions on the relevance of statistics in various fields. **Week 3-4: Data Collection and Presentation** **Topics:** • Data collection methods. • Frequency distributions and graphical representation.	**Interactive Lectures:** • Use engaging lectures to introduce new concepts. • Encourage student participation through questions and discussions. • Provide real-world	**Quizzes and Assignments:** • Regular quizzes and assignments to assess understanding of theoretical concepts. • Provide feedback to help students improve their performance. **Midterm Exam:** • Conduct a midterm exam covering the foundational concepts of the course. • Assess students' ability to apply statistical methods to solve problems.

		Regression and Correlation: • Analyze and interpret relationships between variables using regression and correlation. **Statistical Tests:** • Apply appropriate statistical tests for different types of data (e.g., t-tests, ANOVA, chi-square).	**Activities:** • Hands-on data collection exercises. • Creating histograms, pie charts, and bar graphs. **Week 5-6: Probability** **Topics:** • Probability basics. • Probability distributions. **Activities:** • Probability experiments and simulations. • Calculating probabilities for various events. **Week 7-8: Sampling and Sampling Distributions** **Topics:** • Simple random sampling. • Central Limit Theorem. **Activities:** • Understanding different sampling techniques. • Simulating sampling distributions. **Week 9-10: Confidence Intervals and Hypothesis Testing** **Topics:** • Confidence intervals for means and proportions. • Hypothesis testing basics. **Activities:** • Constructing confidence intervals. • Conducting hypothesis tests. **Week 11-12: Regression and Correlation** **Topics:** • Linear regression. • Correlation. **Activities:** • Regression analysis projects. • Analyzing relationships between variables.	examples to illustrate theoretical concepts. **Hands-on Activities:** • Incorporate practical activities for data collection and analysis. • Use case studies to allow students to apply statistical methods to real-world scenarios. **Technology Integration:** • Utilize statistical software for hands-on experience and practical appli	**Final Exam:** • A comprehensive final exam covering the entire course. • Assess both theoretical knowledge and practical application of statistical methods. **Projects and Case Studies:** • Assign projects or case studies that require students to apply statistical methods to real-world scenarios.

			Week 13-14: Analysis of Variance (ANOVA) and Chi-Square Tests **Topics:** • One-way ANOVA. • Chi-square tests. **Activities:** • Conducting ANOVA experiments. • Applying Chi-square tests to categorical data. **Week 15-16: Review and Application** **Topics:** • Review of key concepts. • Application of statistical methods to real-world problems. **Activities:** • Comprehensive review sessions. • Final project or case study. **Assessment:** **Quizzes and Assignments:** • Regular assessments to gauge understanding. **Midterm Exam:** • Assess understanding of foundational concepts. **Final Exam:** • Comprehensive exam covering the entire course. **Projects:** • Application of statistical methods to practical scenarios. **Additional Considerations:** **Guest Speakers:** • Invite professionals to discuss real-world applications. **Software Training:** • Incorporate training sessions for statistical software tools.	catio n. • Provide tutorials on using software tools for data analysis.	

			Office Hours: • Offer regular office hours for individualized help.		

11.Course Evaluation

Midterm Evaluation:

- Collect feedback on the course structure, teaching methods, and materials midway through the semester.
- Ask specific questions about what is working well and areas for improvement.

End-of-Course Evaluation:

- Gather comprehensive feedback at the end of the course.
- Include questions on course content, teaching effectiveness, assessments, and overall satisfaction

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	**"Elementary Statistics" by Mario F. Triola:** • A popular introductory statistics textbook that covers basic concepts and applications. **"Statistics" by Robert S. Witte and John S. Witte:** • Comprehensive coverage of statistical concepts, suitable for both introductory and intermediate levels. **"The Practice of Statistics" by Daren S. Starnes, Dan Yates, and David S. Moore:** • Known for its emphasis on active learning and data analysis, suitable for high school or college-level courses.
Main references (sources)	**"Statistical Methods for the Social Sciences" by Alan Agresti and Barbara Finlay:** • Aimed at students in the social sciences, covering statistical methods in a clear and accessible manner.
Recommended books and references (scientific journals, reports...)	**The Art of Statistics: Learning from Data" by David Spiegelhalter:** • A book that provides an engaging and accessible introduction to statistics, emphasizing its practical applications. **"Naked Statistics: Stripping the Dread from the Data" by Charles Wheelan:** • An entertaining and insightful book that demystifies statistics and explains its importance in various aspects of life.
Electronic References, Websites	**Khan Academy - Statistics:** • Khan Academy Statistics • Provides free online courses covering a wide range of statistical topics with instructional videos and practice exercises. **Stat Trek:** • Stat Trek • Offers tutorials, calculators, and explanations of statistical concepts for both beginners and advanced learners.

Course Description Form

1. Course Name:
Medical Equipment II
2. Course Code:
MDER324
3. Semester / Year:
2^{nd} semester/ 3^{rd} year
4. Description Preparation Date:
28\1\2024
5. Available Attendance Forms:
Attendance only
6. Number of Credit Hours (Total) / Number of Units (Total)
30 hours in the semester/2
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Mais Odai Abdul Rassul AL-Saffar Email: mais.o.abdulrassul@nahrainuniv@edu.iq

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

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

10. Course Structure

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

11. Course Evaluation

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

35 marks Midterm

5 marks Quizzes

Final Exam (60%)

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

Course Description Form

1. Course Name:

Head & Neck Anatomy

2. Course Code:

MDER322

3. Semester / Year:

2nd Semester /Third year/ 2023-2024

4. Description Preparation Date:

28.1.2024

5. Available Attendance Forms:

Attendance, only

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

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

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

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

8. Course Objectives

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

9. Teaching and Learning Strategies

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

10. Course Structure

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

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

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

1. Course Evaluation

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

2. Learning and Teaching Resources

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

Course Description Form

1. Course Name:
NUMERICAL ANALYSIS
2. Course Code:
MDER321
3. Semester / Year:
2nd / 2023-2024
4. Description Preparation Date:
2.3.2024
5. Available Attendance Forms:
Attendance, only
6. Number of Credit Hours (Total) / Number of Units (Total)
(60 hour/ semester) (4 hour/week) / 4 units
7. Course administrator's name (mention all, if more than one name)
Name: Assis. Lect. Reem Shakir Mahmood Email: reem.sh.mahmood@nahrainuniv.edu.iq
8. Course Objectives

Course Objectives	– Understand Fundamental Concepts of numerical analysis – Learn numerical techniques for solving mathematical problems – Analyze Numerical Algorithms – Implement Algorithms – Evaluate Numerical Solutions – Apply Numerical Methods to medical Problems – Work Collaboratively – Promote Ethical Practices
9. Teaching and Learning Strategies	
Strategy	– Active Learning – Discussion – Group Work/Collaborative Learning promotes teamwork, problem-solving skills – Feedback and Assessment such as quizzes, tests – Experiential Learning

10. Course Structure

W	Hr.	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	– Understanding of Fundamental Concepts – Error Analysis and Error Management	Introduction to Numerical Analysis Objectives of Numerical Analysis Error Definitions Sources of Errors	– Lecture – Discussion	– Homework Assignments – Lab Reports – Midterm Exam
2-3	8	– Analysis of Numerical Algorithms – Understanding of Convergence and Stability – Implementation Skills – Problem-solving	Numerical Solutions of Nonlinear Equations Root Finding Methods 1. Direct Methods 2. Graphical Methods 3. Numerical Methods Bracketing Methods: – The Bisection Method – The False position Method	– Lecture – Flipped Classroom – Group Work/ Collaborative Learning – Experiential Learning	– Lab Reports – Homework Assignments – Class Participation – In-Class Quizzes – Practical Exam – Midterm Exam
4-6	12	– Application of Numerical Technique – Understanding of Convergence and Stability – Implementation Skills – Problem-solving	Numerical Solutions of Nonlinear Equations Root Finding Methods Open methods: – Simple Fixed-Point Iteration – Newton's Method – Secant Methods	– Lecture – Socratic Method – GroupWork/Collaborative Learning – Experiential Learning	– Lab Reports – Homework Assignments – In-Class Quizzes – Practical Exam – Midterm Exam
7	4	Mid-term exam 1			
8	4	Curve fitting	Interpolation • Direct Method Interpolation polynomial • Newton's Interpolation polynomial Lagrange Interpolation polynomial	– Lecture – Discussion – Problem-Based Learning – Cooperative Learning	– Homework Assignments – Class Participation – Midterm Exam
9	4	The approximation in differentiation solution	Numerical Differentiation • First derivative • Second derivative Richardson Extrapolation	– Lecture	– Class Participation – Midterm Exam
10-11	8	The approximation in integration solution	Numerical Integration • Newton-Cotes Formulas • The Trapezoidal Rule • The Composite Trapezoidal Rule • Simpson's Rules • Simpson's 1/3 Rule • The Composite Simpson's 1/3 Rule • Simpson's 3/8 Rule • Integration With Unequal Segments	– Lecture – Problem-Based Learning – Discussion	– Class Participation – Midterm Exam – In-Class Quizzes
12	4	Mid-term exam 2			
13	4	Numerical Analysis - Initial-Value	Ordinary Differential Equations Initial-Value Problems • Euler's Method • Runge-Kutta Methods	– Lecture	– Class Participation
14	4	Numerical Analysis - Curve Fitting	Curve Fitting • Linear Least-Squares Regression	– Lecture	– Class Participation
15	Final Exam				

11.Course Evaluation

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

Theoretical Components (25%):
- Midterm Exam – 15%
- Quizzes – 5%
- Daily Oral Participation – 3%
- H.W. – 2%

Practical Components (15%):
- Practical Exam – 10%
- Lab Assignments/Exercises – 2%
- Lab Reports – 3%

Final Exam (60 %)

12.Learning and Teaching Resources

Required textbooks (curricular books, if any)	1. "*Applied Numerical Methods with MATLAB for Engineers and Scientists*" by Steven C. Chapra 2. "*Numerical Analysis*" by Richard L. Burden and J. Douglas Faires 3. "*Numerical Analysis Using MATLAB and Excel*" by Steven T. Karris
Main references (sources)	"*Numerical Analysis*" by Richard L. Burden and J. Douglas Faires
Recommended books and references (scientific journals, reports...)	*Karris, Steven T. Numerical analysis using MATLAB and Exc Orchard Publications, 2007.*
Electronic References, Websites	-

Course Description Form

1. Course Name: BONE INJURY &FRACTURES

2. Course Code: MDER 325

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

4. Description Preparation Date: 28\1 \2024

5. Available Attendance Forms: Attendance only

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

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

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

8. Course Objectives

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

9. Teaching and Learning Strategies

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

10. Course Structure

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

		structure of bone -To understand bone healing &repair processes	Bone Cells & Bone remodeling	illustrations educational videos , discussions	+discussions Written exam
3	2	To Knowledge &understand causes ,pathogenesis of bone diseases **micr&macroscopic pathological changes of bone diseases** -learning the outcome of diseases &how they managed. -To learn principles diagnostic techniques . -To develop professional medical engineer capabilities of of students	Bone Necrosis, Avascular bone necrosis, bone infection, complications. acute osteomyelitis	=	=
4	2	To Knowledge & understand causes ,pathogenesis of bone diseases . -To understand bone healing &repair in TB - learning the outcome of diseases &how they managed. -To learn principles diagnostic techniques -To developing professional capabilities of students.	Tuberculosis of bones & joints Subperiosteal haematoma	=	=
5	2	To Knowledge & understand causes ,pathogenesis of bone diseases	Metabolic bone diseases;	=	=

		micro & macroscopic pathological changes of bone diseases -learning the outcome of diseases &how they managed. -To learn principles diagnostic techniques -To developing professional capabilities of students.	osteoporosis .pathophysiology osteoporosis .contributors to bone strength . -diseases & medications associated with decreased bone mass.		
6	2	To Knowledge &understand causes ,pathogenesis of bone diseases . **micr&macroscopic pathological changes of bone diseases** - learning the outcome of diseases &how they managed. -To learn principles diagnostic techniques -To developing professional capabilities of students.	Osteomalacia &Rickets, Paget disease, cau .pathogenesis, investigations diagnosis	=	=
7	2	To develop the professional medical engineering capabilities of students in the field of diagnostic devices & technologies.	SCIENTIFIC TRIP		
8	2	To Knowledge &understand causes ,pathogenesis of bone diseases . **micr&macroscopic pathological changes of bone diseases**	Hyper-Parathyroidisim, .Calcium homeostasis	=	=

		- learning the outcome of diseases &how they managed. -To learn principles diagnostic techniques -To developing professional capabilities of students.			
9	2		1ST MID EXAM		
10	2	To Knowledge & understand the normal& abnormal bone structure due to different influencing factors To understand the process of bone-healing &repair after fractures - learning the outcome of diseases &how they managed. -To learn principles diagnostic techniques -To developing professional capabilities of students.	Bone Fracture physiology . Bone healing. Events following fractures Factors influenc healing of fractures complications. Pathological fracture.	=	=
11	2	**To** Knowledge &**understand causes, pathogenesis, micr&macroscopic pathological changes of bone diseases.**	Fibrous dysplasia bone, Paget s disease bone	=	=

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

		-To learn principles diagnostic techniques -To developing professional capabilities of students			
15	2	**-To** Knowledge & **understand causes, pathogenesis, micr&macroscopic pathological changes** -To learn principles diagnostic techniques - To develop professional medical engineering capabilities of students	Muscle diseases	=	discussions

11. Course Evaluation

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

40% (rate of 30% for first and second midterm exams + 5% daily tests + 3% homework + 2% attendance)
+
60% (comprehensive theoretical exam for the entire subject)

12. Learning and Teaching Resources

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

Course Description Form

Biomaterials 1 / MDER415

1. Course Name:
Biomaterials II
2. Course Code:
MDER415
3. Semester / Year:
2023−2024
4. Description Preparation Date:
24/4/2024
5. Available Attendance Forms:
Attendance only
6. Number of Credit Hours (Total) / Number of Units (Total)
2 hours / weak, total = 30 hr / Number of Units: 2
7. Course administrator's name (mention all, if more than one name)
Name: Dr Alaa Ayyed Jebur Al-Taie Email: alaa.ayyed@nahrainuniv.edu.iq
8. Course Objectives

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

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

9. Teaching and Learning Strategies

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

10. Course Structure

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

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

11. Course Evaluation

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

12. Learning and Teaching Resources

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

Course Description Form

1. Course Name:	
Biomechanics II	
2. Course Code:	
MDER420	
3. Semester / Year:	
2nd semester / 4th year	
4. Description Preparation Date:	
1.9.2023	
5. Available Attendance Forms:	
Attendance, only	
6. Number of Credit Hours (Total) / Number of Units (Total)	
5 hours / week, total = 75 hours	
7. Course administrator's name (mention all, if more than one name)	
Name: Dr. Sadiq J. Hamandi, Hamza Abbas Fadhel Email: sadiq.j.abbas@nahrainuniv.edu.iq, hamza.abbas@nahrainuniv.edu.iq	
8. Course Objectives	
Course Objective	• Discuss the interrelationships among kinematic variables and angular kinematic variables • Explain the relationships among angular and linear displacement, angular and linear velocity, and angular and linear acceleration. • Describe the processes involved in the biomechanics of human bone growth and development, human skeletal articulations, and human skeletal muscle • Identify Newton's laws of motion and gravitation and describe practical illustrations of the laws. • Discuss the human movement in a fluid medium.
9. Teaching and Learning Strategies	
Strategy	Assessment is based on hand-in assignments, written exam, Case study, Quizzes, seminars, Practical testing and Online testing.

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

14	5	Classify Nonparallel Forces	Static Planar Model of Nonparallel Forces	Solving Problems Lab	-
15	5		Midterm Exam 2		Mid Exams

11. Course Evaluation

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

12. Learning and Teaching Resources

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

Course Description Form

1. Course Name:
Telemedicine
2. Course Code:
MDER422
3. Semester / Year:
2nd semester / 4th year
4. Description Preparation Date:
1.9.2023
5. Available Attendance Forms:
Attendance, only
6. Number of Credit Hours (Total) / Number of Units (Total)
2 hours / week, total = 30 hours
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Salman Majid Salman Email: salman.m.salman@nahrainuniv.edu.iq
8. Course Objectives

Course Objectives	• Learn the basics and principles of modern communication in medicine and its applications.
9. Teaching and Learning Strategies	
Strategy	Assessment is based on hand-in assignments, written exam, and home works.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Introduction	Introduction	Lectures	-
2	2	Telemedicine techniques and issues	Telemedicine and its Role in Health Care	Lectures	-
3	2	Telemedicine techniques and issues	Communication Networks and Services-1	Lectures	-

4	2	Telemedicine techniques and issues	Communication Networks and Services-2	Lectures	Home Work
5	2	Telemedicine techniques and issues	Wireless Technology in Patient Monitoring-1	Lectures	Quiz
6	2	Telemedicine techniques and issues	Wireless Technology in Patient Monitoring-2	Lectures	-
7	2	Telemedicine techniques and issues	Telemedicine Systems and Infrastructure-1	Lectures	Home Work
8	2	Mid-Exam-1	Mid-Exam-1	Mid-Exam-1	Mid-Exam-1
9	2	Telemedicine techniques and issues	Telemedicine Systems and Infrastructure-2	Lectures	-
10	2	Telemedicine techniques and issues	Telemedicine Systems and Infrastructure-3	Lectures	Home Work
11	2	Telemedicine techniques and issues	Information Technology in Telemedicine-1	Lectures	-
12	2	Telemedicine techniques and issues	Information Technology in Telemedicine-2	Lectures	-
13	2	Telemedicine techniques and issues	Information Technology in Telemedicine-3	Lectures	Quiz
14	2	Telemedicine techniques and issues	Data Privacy and Ethical Issues	Lectures	-
15	2	Mid-Exam-2	Mid-Exam-2	Mid-Exam-2	Mid-Exam-2

11. Course Evaluation

Mid Exam 1: 12.5%
Mid Exam 2: 12.5%
Home Works and Quizzes: 15%
Final Exam: 60%

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	1.
Main references (sources)	1. Fong B., Fong A., Li C. - Telemedicine technologies_ Information technologies in medicine and telehealth-Wiley (2011)

Recommended books and references (scientific journals, reports...)	1. Telemedicine: The Computer Transformation Healthcare, Tanupriya Choudhury, Avita Katal, Jung-Um, Ajay Rana, Marwan Al-Akaidi (2022)
Electronic References, Websites	

Course Description Form

1. Course Name: Digital Electronic II
2. Course Code:
3. Semester / Year: 2/2023-2024
4. Description Preparation Date:
5. Available Attendance Forms:
Google sheet
6. Number of Credit Hours (Total) / Number of Units (Total)
Lectures (2 hours/week) Tutorials (1 hour/week) Laboratory Sessions (2 hours/week)
7. Course administrator's name (mention all, if more than one name)
Name: Ahmed faeq Email: ahmed.f.hussein@nahrainuniv.edu.iq

8. Course Objectives	
Course Objectives	• Understand the fundamental concepts of digital electronics, including number systems, Boolean algebra, and logic gates. • Analyze and design combinational logic circuits using various techniques. • Explain the operation of sequential circuits, including flip-flops, shift registers, and counters. • Implement digital circuits using breadboards and programmable devices. • Troubleshoot and debug digital circuits. • Effectively communicate technical information through reports and presentations. •
9. Teaching and Learning Strategies	
Strategy	• Interactive lectures with real-world examples and applications. • Hands-on laboratory experiments to reinforce theoretical concepts. • Online resources and quizzes for self-paced learning and assessment.

	• Group projects to encourage teamwork and problem-solving skills. • Opportunities for individual consultations and feedback.

10. Course Structure

Week	Hours (Lecture/Tutorial/Lab)	Required Learning	Topics	
1	Introduction to Digital Electronics, Number Systems	Lecture, Online Resources	Class Participation, Quiz	
2	Boolean Algebra, Logic Gates	Lecture, Online Resources	Lab 1: Basic Logic Gates	
3	Combinational Logic Design	Lecture, Online Resources	Lab 2: Combinational Circuit Design	
4	Midterm Exam Review	Review Session, Online Resources	Midterm Exam	
5	Introduction to Sequential Circuits	Lecture, Online Resources	Quiz	
6	Flip-flops	Lecture, Online Resources	Lab 3: Flip-flop Circuits	
7	Shift Registers	Lecture, Online Resources	Lab 4: Shift Register Applications	
8	Counters	Lecture, Online Resources	Lab 5: Counter Design	
9	Introduction to Programmable Logic Devices (PLDs)	Lecture, Online Resources	Lab 6: Introduction to PLDs	
10	PLD Programming and Design	Lecture, Online Resources	Lab 7: PLD-based Project	
11	Interfacing Digital Circuits with External Devices	Lecture, Online Resources	Lab 8: Digital System Interfacing	
12	Troubleshooting Digital Circuits	Lecture, Online Resources	Lab Report for Labs 3-8	
13	Final Exam Review	Review Session, Online Resources	Class Participation	
14	Final Exam	Final Exam	Final Exam	
15	Course Wrap-up	Presentation of Projects	-	

11. Course Evaluation

12. Learning and Teaching Resources

	Morris Mano, "Digital Design: With an Introduction to the Verilog HDL" (Latest Edition)
	Microelectronic Circuits by Sedra & Smith (This advanced text provides an in-depth exploration of F and Op-Amps, suitable for students seeking a deeper understanding.)

Course Description Form

1. Course Name:	
Therapeutic Instrumentation	
2. Course Code:	
MDER 424	
3. Semester / Year:	
2nd / 4th Year	
4. Description Preparation Date:	
24.2.2024	
5. Available Attendance Forms:	
Attendance, only	
6. Number of Credit Hours (Total) / Number of Units (Total)	
4 hours / week, total =60 hr	
7. Course administrator's name (mention all, if more than one name)	
Name: Lect. Dr. Samar Ali Jaber Email: samar.a.jaber@nahrainuniv.edu.iq	
8. Course Objectives	
Course Objectives	Lectures and lab session were conducted to teach the students to learn about therapeutic medical devices in the following aspects: 1. Physiological basis of the human interface with the therapeutic device 2. Clinical applications 3. Safety and regulatory environment for those device installation 4. Maintenance and troubleshooting and possible faults 1. CLO-1: Understanding the principles and fundamentals of therapeutic instrumentation and acquiring knowledge of different types of therapeutic instruments and their applications. 2. CLO-2: Gaining proficiency in the use of therapeutic instruments for the treatment and management of various medical conditions. 3. CLO-3: Developing skills in the calibration, maintenance, and troubleshooting of therapeutic instruments while demonstrating competence in ensuring the accuracy and reliability of medical measurements and data. 4. CLO-4: Familiarity with safety protocols and regulations related to therapeutic instrumentation by applying critical thinking and problem-solving skills to identify and address issues with medical instruments. Developing an understanding of the ethical considerations and legal implications associated with medical instrumentation. 5. CLO-5: Enhancing communication and teamwork skills necessary for effective collaboration with healthcare professionals as well as keeping up to date with advancements in medical technology and staying updated on the latest advancements in therapeutic instrumentation and incorporating new technologies into practice.
9. Teaching and Learning Strategies	
Strategy	Assessment is based on hand-in assignments, written exam, Case study, Quizzes, seminars, Practical testing and Online testing.
10. Course Structure	

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

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

Course Description Form

Thermo-Fluid Mechanics II / MDER426

1. Course Name:
Thermo-Fluid Mechanics II
2. Course Code:
MDER426
3. Semester / Year:
2023-2024
4. Description Preparation Date:
28/1/2024
5. Available Attendance Forms:
Attendance only
6. Number of Credit Hours (Total) / Number of Units (Total)
3 hours / weak, total = 45 hr / Number of Units: 2
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Basma Abdulsahib Faihan Email: basma.a.faihan@nahrainuniv.edu.iq
8. Course Objectives

Course Objectives	The course aims to introduce students to the basic concepts of heat transfer modalities and heat exchanger design. Then, movement of molecules through membranes is studied via Fick's law of diffusion. Psychometric processes and gas mixing is also studied. Finally, the movement of a substance from one compartment to another is studied through compartmental modeling.

9. Teaching and Learning Strategies

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

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Introduction	Introduction to fluids mechanics	Lecture	Discussion
2-3	4	Understanding energy and the first law of thermodynamics	Using Energy and The First Law of Thermodynamics	Lecture	Quiz

4-5	4	Understanding heat transfer modalities, heat exchangers and their applications in biomedical engineering	Heat Transfer Mechanisms	Lecture	Exam
6	2	- Analysis, justification and comparison. - Accuracy of observation and depth of thinking.	Mid-term exam 1	-	-
7	2	Understanding the movement of molecules physics and the analogy with heat transfer	Fundamentals of Mass Transfer	Lecture	Exam
8-9	4	Understanding the movement of molecules physics and the analogy with heat transfer	Diffusion	Lecture	Design assessment
10-11	2	Understanding how to use charts in the design process	Psychometric processes	Lecture + Discussion	Exam
12	2	Analysis, justification and comparison. - Accuracy of observation and depth of thinking. - The accuracy of decision-making	Mid-term exam 2	-	-
13-14	4	Understanding how to model the movement of molecules between systems	Compartmental modeling	Lecture + Discussion (case studies)	Quiz
15	3	Final Exam			

11.Course Evaluation

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

12.Learning and Teaching Resources

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

	- Transport Phenomena In Biomedical Engineering Principles And Practices, Robert A. Peattie, Robert J. Fisher,
Electronic References, Websites	

Course Description Form

1. Course Name:

IMAGE PROCESING

2. Course Code:

MDER427

3. Semester / Year:

2nd / 2023-2024

4. Description Preparation Date:

2.3.2024

5. Available Attendance Forms:

Attendance, only

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

(60 hour/ semester) (4 hour/week) / 4 units

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

Name: Assis. Lect. Reem Shakir Mahmood

Email: reem.sh.mahmood@nahrainuniv.edu.iq

8. Course Objectives

Provide students with a foundational understanding of digital image analysis principles and techniques, including image representation, basic operations, enhancement, segmentation, and feature extraction, to analyze and interpret digital images effectively.

9. Teaching and Learning Strategies

Strategy	– Lecture – Discussion – Group Work/Collaborative Learning promotes teamwork, problem-solving skills – Feedback and Assessment such as quizzes, tests – Experiential Learning

10. Course Structure

Week	Hr.	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1-2	8	Understanding of Digital Image Fundamentals, Ethical Considerations	Introduction to the Digital Image Processing – Characteristics of Image Acquisition Devices – Components of an Image Processing System – Simple Image Formation Model – Image Sampling and Quantization	Lecture, Discussion	– Homework Assignments – Lab Reports – Midterm Exam
3	4		Images types Some Basic Relationships between Pixels – Neighbors of a pixel – Adjacency, Connectivity – Distance Measures	– Lecture – Flipped Classroom – Group Work/ Collaborative Learning – Experiential Learning	– Lab Reports – Homework Assignments – Class Participation – In-Class Quizzes – Practical Exam Midterm Exam
4	4		– The Mathematical Tools Used in Digital Image Processing – Histogram Processing	– Lecture – Socratic Method – GroupWork/Collaborative Learning – Experiential Learning	– Lab Reports – Homework Assignments – In-Class Quizzes – Practical Exam – Midterm Exam
5	4	Mid-term exam 1			
6	4	Ability to Perform Basic Image Operations, Proficiency in Image Preprocessing Techniques, Hands-on Experience with Image Analysis Software	Basic Intensity Transformation Functions 1. Image Negatives 2. Log Transformations 3. Power-Law Transformations	– Lecture – Discussion – Problem-Based Learning Cooperative Learning	– Homework Assignments – Class Participation – Midterm Exam
7	4		Piecewise Linear Transformation Functions – Contrast Stretching – Intensity-Level Slicing – Bit-Plane Slicing Histogram Processing – Histogram Equalization	– Lecture – Flipped Classroom – Group Work/ Collaborative Learning – Experiential Learning	– Class Participation – Midterm Exam
8-9	8		Image enhancement in the Spatial Domain – Fundamentals of Spatial Filtering – Smoothing (Lowpass) Spatial Filters a. standard average b. weighted average – Order-Statistic (Nonlinear) Filters – Sharpening (Highpass) Spatial Filters a. Laplacian b. Gradient	– Lecture – Problem-Based Learning – Discussion	– Class Participation – Midterm Exam – In-Class Quizzes
10	4	Mid-term exam 2			
11	4	Application of Basic Image Analysis Techniques, Problem-Solving Skills	Image enhancement in the Frequency Domain – Introduction to Fourier transform – The two-dimensional DFT and its Inverse – Frequency Domain Filtering Fundamentals	– Lecture – Problem-Based Learning – Discussion	–Class Participation –Homework Assignments –Lab Reports
12	4		Image Smoothing Using Lowpass Frequency Domain Filters – Ideal Lowpass Filters – Gaussian Lowpass Filters – Butterworth Lowpass Filters	– Lecture – Problem-Based Learning – Discussion	–Class Participation
13	4		Image Sharpening Using High-pass Filters – Ideal Highpass Filters – Gaussian Highpass Filters Butterworth Highpass Filters	– Lecture	– Class Participation
14	4	Image type	Color Image Processing	Lecture	– Class Participation
15		Final Exam			

11.Course Evaluation

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

Theoretical Components (25%):

Midterm Exam – 15%
Quizzes – 5%
Daily Oral Participation – 3%
H.W. – 2%

Practical Components (15%):

Practical Exam – 10%
Lab Assignments/Exercises – 2%
Lab Reports – 3%

Final Exam (60 %)

12.Learning and Teaching Resources

Required textbooks (curricular books, if any)	1. "*Digital image processing*." by Gonzalez RC. 2. "*Digital Image Processing Using MATLAB*" by Gonzalez RC.
Main references (sources)	"*Digital image processing*." by Gonzalez RC.
Recommended books and references (scientific journals, reports...)	"*Digital image processing*." by Gonzalez RC.
Electronic References, Websites	–

Course Description Form

Biomedical Engineering Department

Analytical Mechanics

1. Course Name:
Analytical Mechanics
2. Course Code:
MDER423
3. Semester / Year:
2nd / 2023-2024
4. Description Preparation Date:
2.3.2024
5. Available Attendance Forms:
Attendance, only
6. Number of Credit Hours (Total) / Number of Units (Total)
2 hours / week, total =30 hr, Number of Units: 2 units.
7. Course administrator's name (mention all, if more than one name)
Name: Lecturer Dr. Ali M. Miftin Email: ali.m.miftin@nahrainuniv.edu.iq
8. Course Objectives

Course Objectives The student will study Mechanical theories and application. On completion of this course the student will be able to:	-Invent vibrator components for certain purposes - Fix equipment unbalance - Study biomechanics
9. Teaching and Learning Strategies	
Strategy	- applying concepts in the real world - problem solving – based leaning strategy - collaborative concept planning

10. Course Structure					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
1	2	A1 B1	OSCILLATORY MOTION Harmonic Motion Periodic Motion Vibration Terminology	Lecture	HW
2	2	A1 B1	FREE VIBRATION Equation of Motion-Natural Frequency Energy Method	Lecture	HW
3	2	A3 B3	Viscously Damped Free Vibration Logarithmic Decrement	Lecture	Seminar
4	2	A1 A3 B1 B3	HARMONICALLY EXCITED VIBRATION Forced Harmonic Vibration	Lecture	HW Onsight assignment
5	2	A2 B2	Rotating Unbalance	Lecture	HW Quiz
6	2	A2 B2	Support Motion	Lecture	HW
7	2	A2 B2	Vibration Isolation	Lecture	HW
8	2		MID EXAM		Exam
9	2	A2 B2	Vibration Measuring Instruments	Lecture	HW
10	2	A2 B2	Eigenvalues and Eigenvectors	Lecture	HW Onsight assignment
11	2	A2 B2	Orthogonal Properties of Eigenvectors	Lecture	HW
12	2	A1 A2 B2	Systems with two or more degrees of freedom	Lecture	Quiz
13	2	A2 B2	Normal Mode Analysis	Lecture	HW

14	2	A2 B2	Forced Harmonic vibration	Lecture	Seminar
15	2		MID EXAM		Exam

11.Course Evaluation	
Distributing the score out of 100 according to the tasks assigned: MID EXAMS 30, Homework assignments and quizzes 10, Final Exam 60.	
12.Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Theory of vibration with applications/ THOMSON
Main references (sources)	
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	Microsoft Math soft MathCad Autograph

Course Description Form

1. Course Name:	
Biotribology	
2. Course Code:	
MDER522	
3. Semester / Year:	
2nd semester / 5th year	
4. Description Preparation Date:	
1.9.2023	
5. Available Attendance Forms:	
Attendance, only	
6. Number of Credit Hours (Total) / Number of Units (Total)	
2 hours / week, total = 30 hours	
7. Course administrator's name (mention all, if more than one name)	
Name: Dr. Sadiq J. Hamandi Email: sadiq.j.abbas@nahrainuniv.edu.iq	
8. Course Objectives	
Course Objectives	• Introduce the fundamentals of friction and its relevance in component design and surface engineering. • Introduce key tribological principles related to wear, methods for mitigation and underpinning mathematical concepts. • Introduce the theory of contact mechanics and evaluate its impact on the performance of components. • Develop the ability to apply lubrication science to engineering components. • To enable student to apply the above techniques to a range of engineering components, evaluate failure mechanisms and compare key design features that improve performance • Develop solutions to biotribological industrial design problems through the application of biotribological analysis.
9. Teaching and Learning Strategies	
Strategy	Assessment is based on hand-in assignments, written exam, Case study, Quizzes, seminars, Practical testing and Online testing.

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

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

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

Course Description Form

1. Course Name:
Control II
2. Course Code:
MDER 522
3. Semester / Year:
2023- 2024/ 5th
4. Description Preparation Date:
28/ 2/ 2024
5. Available Attendance Forms:
in-person only
6. Number of Credit Hours (Total) / Number of Units (Total)
6 Hours / 3 Units/ total= 90 hr
7. Course administrator's name (mention all, if more than one name)
Name: Asst.Prof.Dr. Hdaeel Kassim Aljobouri Email: hadeel_bme77@yahoo.com
8. Course Objectives

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

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

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3h	Bode Plots		**Lectures and Tutorials**	Assessment is based on hand-in assignments, written exams, Case studies, Quizzes, seminars, Practical testing, and Online testing.
2	3h	Nichols chart & Nyquist plots			
3	3h	Modern Control Theory			
4	3h	Mathematical Modeling of Dynamic Systems			
5	3h	State-Space Representation			
6	3h	Frequency Domain to time Domain Conversion in State-Space			
7	3h	Midterm Exam1			

8	3h	Transfer Matrix and Solution of State Equations	Control 2		
9	3h	Controllability and Observability			
10	3h	Construction of Root Locus			
11	3h	Closed loop stability via Root Locus			
12	3h	Midterm Exam2			
13	3h	Steady-state error			
14	3h	Modes of controllers			
15	3h	Digital PID Tuning Rules			

11.

Tests: (5%)

Assignments: (5%)

Mid-Semester Exam: (15%)

Lab Sessions: (15%)

Final Exam: (60%)

12.

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

Signature: hadeel

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

Date: **28/ 2/ 2024**

Course Description Form

1. Course Name: Engineering Management
2. Course Code: CREQ512
3. Semester / Year: 2nd semester/ 5th year
4. Description Preparation Date: 26/02/2024
5. Available Attendance Forms: Attendance only
6. Number of Credit Hours (Total) / Number of Units (Total): 2 hours/week, total = 30 hr
7. Course administrator's name (mention all, if more than one name)
Name: Dr Muna Mustafa Kareem Email: muna.kareem@nahrainuniv.edu.iq

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

9. Teaching and Learning Strategies	
Strategy	1- Lectures 2- Discussion in the classroom 3- Seminars

10. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1+2	4	Understand the general concepts of management	Introduction to Management	Lecture	1. Exams 2. Quizzes 3. Reports
3	2	Identify the different types of organizational	Organizational Structure and Span of Control	Lecture	

		structures with their advantages and disadvantages			
4+5	4	Defining the roles and functions of hospital management	Introduction to Hospital Management	Lecture	
Monthly Exam (1)					
7- 9	6	Know the responsibilities that must be covered by financial management, the budget preparation process, and financial control	Financial Management in Healthcare Organizations	Lecture	
10	2	Identify risks and take the necessary steps or measures to mitigate their harmful effects.	Risk Management	Lecture	
Monthly Exam (2)					
12	2	Understand, apply and improve materials management in healthcare	Materials Management	Lecture	
13	2	How to manage laboratories in health institutions and the most important materials and equipment in them	Laboratory management	Lecture	
14	2	Apply marketing strategies to promote health services	Marketing of Health Services	Lecture	
15	Final Exam				

11.Course Evaluation
1- Quizzes (10%)

2- 2 monthly exams (20%) 3- Seminars (10%) 4- Final exam (60%)	
12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	1. Gupta AK. Engineering Management. S. Chand Publishing, 2014. 2. Sakharkar B. Hospital Administration Principles of and Planning. Jaypee Brothers Medical Publishers, 2009.
Main references (sources)	Bhatia D, Chaudhari PK, Chaudhary B, et al. (eds). A Guide to Hospital Administration and Planning. Springer, 2023.
Recommended books and references (scientific journals, reports...)	Clinical Engineering Handbook (2nd edition), edited by Ernesto Iadanza, 2019.
Electronic References, Websites	

Course Description Form

Elective IV/ MDER525

′ Signal and Systems ′

1. Course Name:
Elective IV: Signal and Systems
2. Course Code:
MDER525
3. Semester / Year:
2023-2024
4. Description Preparation Date:
24/4/2024
5. Available Attendance Forms:
Attendance + Lab sessions
6. Number of Credit Hours (Total) / Number of Units (Total)
4 hours / weak, total = 60 hr / Number of Units: 3
7. Course administrator's name (mention all, if more than one name)
Name: L. Basma Abdulsahib Faihan Email: basma.a.faihan@nahrainuniv.edu.iq
8. Course Objectives

Course Objectives	The course aims to provide students with a fundamental understanding of signals and systems theory and its application to the field of healthcare and medical technology.
9. Teaching and Learning Strategies	
Strategy	– Active Learning and Brainstorming – Problem-Based Learning – Real-World Applications – Collaborative Learning through reports

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	Demonstrate an advanced understanding of the principles of digital signal	Introduction	Learning about the unique characteristics and challenges	Discussion

		processing		of biomedical signals	
2-3	8	-Critical Thinking and Problem Solving. -Evaluate the impact of sampling and quantization on the fidelity of signals. -Critically assess trade-offs between sampling rates, quantization levels, and computational complexity	Sampling and Quantization	Lecture+ Lab	Exam
4	4	Systematically apply methods to extract relevant information from biomedical signal measurements	Convolution and Correlation	problem-solving exercises+ Lab	Quiz
5	X	-	Graduation Day! : Academic Sabbatical	-	-
6	2	Systematically apply methods to extract relevant information from biomedical signal measurements	Discrete Fourier Transform (DFT)	Lecture+ Lab	Exams
7	2		Mid 1	-	
8	2	-Apply the Z-Transform to solve problems related to signal processing, such as convolution and system response analysis. - Utilize the Z-Transform in practical scenarios, including digital filter design and analysis.	Z-Transform	problem-solving exercises + Lab	Quiz + report
9-10	3	- Critically analyze and compare different filter design approaches. - Apply filter design principles to address complex signal processing challenges.	Filter Design	Lecture+ Lab	Quiz + report
11	X	-	Eid al Fitr	-	
12	4		Mid 2	-	Design Assessment
13	4	Systematically apply methods to extract relevant information from biomedical signal measurements	Spectral analysis	Discussion	Report
14	X	-	International Workers' Day	-	-
15	4	Critically assess the appropriateness of	Digital Signal Processing in Biomedical	Clinical Applications and Case	Discussion

		biomedical signal processing techniques for various problems in the field.	Applications	Studies	
	3	Final Exam			

11.Course Evaluation

Midterm exams:
Quizzes: 10
Assessment: 5
Lab: 15
Final Exam: 60

12.Learning and Teaching Resources

Required textbooks (curricular books, if any)	John G. Proakis, Dimitris K Manolakis, Digital Signal Processing (4th Edition), 2006
Main references (sources)	Signals & Systems, Alan V. Oppenheim, Alan S. Willsky, with S. Hamid Nawab. - 2nd ed.
Recommended books and references (scientific journals, reports...)	Circuits, Signals, And Systems For Bioengineers, John Semmlow, Academic Press 3rd Edition.
Electronic References, Websites	

Course Description Form

1. Course Name:	
Modern Medical Equipment	
2. Course Code:	
MDER520	
3. Semester / Year:	
Second / 2023-2024	
4. Description Preparation Date:	
28.2.2024	
5. Available Attendance Forms:	
Attendance only	
6. Number of Credit Hours (Total) / Number of Units (Total)	
2 hours/week, Total = 30 hours, 2 Units	
7. Course administrator's name (mention all, if more than one name)	
Name: **Dr Hassanain Ali Lafta** Email: **hassanain.a.lafta@nahrainuniv.edu.iq**	
8. Course Objectives	
Course Objectives	**This course aims to provide knowledge about learning the clinical problems for which modern medical equipment, artificial organs and prosthetic devices in particular, are used besides understanding the basic principles and engineering concepts to design and develop such medical equipment.**
9. Teaching and Learning Strategies	
Strategy	▪ **Understand the clinical problems for which artificial organs and prosthetics devices are used besides learning the basic mechanisms and design of such medical equipment.** ▪ **Understand the classification, characteristics and design criteria of artificial organs and prosthetic devices.** ▪ **Quantitatively describe the heart lung machine, artificial hearts and VADs and cardiac pacemakers in terms of their mechanisms and structural components.** ▪ **Analyzing the system performance of prosthetic heart valves and haemodialyis machine in terms of their design consideration and components evaluation.**

10. Course Structure					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
1	**2**	**CLO-1: Understand the clinical problems for which artificial organs and prosthetics devices are used besides learning the basic mechanisms and design of such medical equipment.**	**Course Description and Introduction**	**Theoretical Lectures + Presentations + Discussions**	**Quizzes and Midterm Exams**
2	**2**	**CLO-2: Understand the classification, characteristics and design criteria of artificial organs and prosthetic devices.**	**Introduction to Artificial Organs and Prosthetic Devices**		
3	**2**	**CLO-3: Quantitatively describe the heart lung machine, artificial hearts and VADs in terms of their mechanisms and structural components.**	**Heart Lung Machine**		
4	**2**		**=**		
5	**2**		**Artificial Hearts and Cardiac Assist Devices**		
6	**2**		**Midterm Exam 1**		
7	**2**		**Artificial Hearts and Cardiac Assist Devices**		
8	**2**	**CLO-4: Analyzing the system performance of prosthetic heart valves, pacemakers and haemodialyis machine in terms of their design consideration and components evaluation.**	**Cardiac Valve Prostheses**		
9	**2**		**=**		
10	**2**		**Artificial Kidney – Haemodialysis Machine**		
11	**2**		**Artificial Kidney – Haemodialysis Machine**		
12	**2**		**=**		
13	**2**		**Midterm Exam 2**		
14	**2**		**Artificial Cardiac Pacemakers**		
15	**2**		**=**		

11.Course Evaluation	
Distributing the student's score out of 100 according to the tasks assigned as follows; %40 for Quizzes and Midterm Exams. %60 for Final Examination.	
12.Learning and Teaching Resources	
Required textbooks (curricular books, if any)	▪ **Introduction to Biomedical Engineering, J. Bronzino , 3rd Edition, 2012, Academic Press.** ▪ **Medical Devices and Systems, Joseph D. Bronzino, 2006, CRC, Taylor & Francis.**
Main references (sources)	▪ **The Biomedical Engineering Handbook, Joseph Bronzino, 4th Ed. 2015, CRC Press.**
Recommended books and references (scientific journals, reports...)	▪ **Artificial Organs, Gerald E. Miller, 1st Ed. 2006, Morgan & Claypool 2006.** ▪ **Sensory Organ Replacement and Repair, Gerald E. Miller, 1st Ed. 2006, Morgan & Claypool 2006.**
Electronic References, Websites	**Relevant Educational You tubes.**

Course Description Form

1. Course Name:
Electromechanical Design
2. Course Code:
MDER520
3. Semester / Year:
One semester per year
4. Description Preparation Date:
1/9/2023
5. Available Attendance Forms:
Attendance only
6. Number of Credit Hours (Total) / Number of Units (Total)
30 hours in the semester/2
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Mais Odai Abdul Rassul AL-Saffar Email: mais.o.abdulrassul@nahrainuniv@edu.iq
8. Course Objectives

Course Objectives	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

9. Teaching and Learning Strategies

Strategy	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; • Question and answer sessions during lectures or staff Office Ho

10. Course Structure

11.

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Bio Micro Electro Mechanical Systems	BioMEMS Technologies	Theoretical scientifi lectures + scientific or interactive media presentations	Oral questions during the lectur
2	2	Bio Micro Electro Mechanical Systems	Materials for MEMS manufacturing	Theoretical scientifi lectures + scientific or interactive media presentations	Oral questions during the lectur
3	2	Bio Micro Electro Mechanical Systems	MEMS proces steps	Theoretical scientifi lectures + scientific or interactive media presentations	Oral questions during the lectur
4	2	Applications of MEMS Surgery	Biocompatibil and Packaging	Theoretical scientifi lectures + scientific or interactive media presentations	Oral questions during the lectur
5	2	Mid Exam I			Mid Exam I
6	2	Applications of MEMS Surgery	Generation of Surgical Procedures	Theoretical scientifi lectures + scientific or interactive media presentations	Oral questions during the lectur
7	2	Applications of MEMS Surgery	Tactile Feedba	Theoretical scientifi lectures + scientific or interactive media presentations	Oral questions during the lectur
8	2	Applications of MEMS Surgery	Using Tactile Sensor In Surgical Tool	Theoretical scientifi lectures + scientific or interactive media presentations	Oral questions during the lectur
9	2	Applications of MEMS Surgery	Printable Strai Gauges	Theoretical scientifi lectures + scientific	Oral questions during the lectur

				or interactive media presentations	
10	2	An Artificial Tactile Sensor	The BioTac Design	Theoretical scientifi lectures + scientific or interactive media presentations	Oral questions during the lectur
11	2	Mid exam II			Mid Exam II
12	2	MEMS in drug delivery Systems	Types of Drug Delivery Syst	Theoretical scientifi lectures + scientific or interactive media presentations	Oral questions during the lectur
13	2	MEMS in drug delivery Systems	Types of Derr Delivery	Theoretical scientifi lectures + scientific or interactive media presentations	Oral questions during the lectur
14	2	MEMS in drug deliver Systems	Microneedle Patches	Theoretical scientif lectures + scientific or interactive media presentations	Oral questions during the lecture
15	2	Application of MEMS eye surgery	Retinal Implan	Theoretical scientif lectures + scientific or interactive media presentations	Oral questions during the lecture

12. Course Evaluation

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

13. Learning and Teaching Resources

Required textbooks (curricular books, if any)	
Main references (sources)	Main references (sources) 1.Electromechanical Design Handbook Edition By Ronald A Walsh
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

Course Description Form

1. Course Name:

Biomedical Sensor

2. Course Code:

MDER526

3. Semester / Year:

1st / 2023−2024

4. Description Preparation Date:

24.2.2024

5. Available Attendance Forms:

Attendance, only

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

3hours / week, total =45 hr

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

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

8. Course Objectives

1- To learn basic concepts of biomedical sensor.
2- To understand a biomedical sensors fundamentals and design.
3- To learn the suitable application of each sensor.
4- To describe the types of biomedical sensors and principle of work.

9. Teaching and Learning Strategies

Strategy	Course is designed to learn the student three principles: 1- Mathematics concepts. 2- How to measure the electrical signals from the body by these sensors. 3- How to recognize the suitable type of sensors.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	1. Understand the general definition, characteristics, principles, and requirements of medical instrumentation systems, including	General definition, Characteristics, Princip and requirements	Theoretical scientific lectures	
2	3		Electrodes, definition, electronic CCT, types	Theoretical scientif lectures	Quiz

3	3	their differences fr conventional syste 2. Identify and describe electrode including their definition, electron circuitry, and varie types used in med applications. 3. Explore transducers, inclu their properties, types, and applications in medical instrumentation. 4. Study resistive transducers and th role in medical measurement systems. 5. Examine thermometric transducers, their principles, and the applications in medical devices. 6. Analyze photoelectric transducers, their functioning principles, and the utilization in medi equipment. 7. Investigate piezoelectric and ultrasound transducers, inclu their properties, working principles and medical applications. 8. Explore chemica transducers and th applications in medical sensing ar diagnostics, includ seminar discussion 9. Learn about pressure measurement transducers, their types, and their significance in medical instrumentation.	Transducers, properties types	Theoretical scientif lectures	
4	3		Resistive transducers	scientific interactive media presentations	
5	3		Thermometric transduc and medical applicatio	scientific interactive media presentations	
6	3		Semester Examination	Theoretical scientif lectures	
7	3		Photoelectric transduce and medical applicatio Photoelectric transduce and medical applicatio	Photoelectric transdu and medical applicatio	
8	3			Photomultiplier scintillation counter their applications/semi	
9	3			Photoelectric transdu and medical applicatio	
10	3		Piezoelectric and ultrasou transducers and medical applications	scientific or interactive media presentations	
11	3		Semester Examination 2	Theoretical scientif lectures	
12	3		Chemical transducers a medical applications/ seminars	scientific interactive media presentations	
13	3		Pressure measurement transducers	Theoretical scientif lectures	

14	3		Motion and force sens and medical applications/seminars	Theoretical scientif lectures	
15	3		Semester Examination		

11. Course Evaluation

	Test	Date	Mark
1	Test I	Week 4	10 %
2	Mid-Semester Exam	Week 9	20 %
3	Test II	Week 12	10 %
4	Assignment I	Week 7	5 %
5	Assignment II	Week 13	5 %
6	Final Exam	Week 17-18	50 %
	Total Marks		100 %

Distributing the score out of 100 according t the ta to the student such as daily preparation, da y oral written exams, reports .... etc

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	1. Sensors in Biomedical Applic tions technology and applications, 2000.
Main references (sources)	1. Sensors in Biomedical Applications: fundam entals and applications, 2000. 2. Biomedical Transducers and Instruments, Tats uo To 3. Biosensors, Sarah A. Jackson, 1993. 4. Introduction to Biomedical Engineering, Jos eph D 2005.
Recommended books and references (scientific journals, reports...)	Introduction to Biomedical Engineering Jose 2005.
Electronic References, Websites	Research gate