Ministry of Higher Education and Scientific Research

Misan University
College of science
Physic Department

Academic Program and Course Description Guide

2024−2025

Introduction:

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

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

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

Concepts and terminology:

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

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

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

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

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

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

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

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

Academic Program Description Form

University Name: **Misan University**

Faculty/Institute: **Collage of science**

Scientific Department: .**Physics department**.

Academic or Professional Program Name: **General Physics and Medical Physics**

Final Certificate Name: B.Sc. degree **in general physics and medical physics**

Academic System: **Semester** (**courses**) **and polonia systems**

Description Preparation Date: **19/1/2025**

File Completion Date: **19/2/2025**

Signature: 

Head of Department Name:

Asst. Prof. Dr.. Ahmed Khalaf Zager

Date: / / **2025**

Signature: 

Scientific Associate Name:

Asst. **Prof**. **Dr**. **Salah Hassan Faraj**

Date: / / **2025**

The file is checked by:

Department of Quality Assurance and University Performance

Director of the Quality Assurance and University Performance Department: **Date**: / / **2025**

Signature:

Approval of the Dean

Date: / / **2025**

1. Program Vision

The College of Science aims to prepare graduates in the fields of general and medical physical sciences to work in governmental sectors, and to benefit from specialization in practical and applied fields, particularly in education and healthcare.

The program's vision in the Department of General and Medical Physics is to make a qualitative shift in the quality of higher education, leadership, and innovation in scientific research, to elevate the university to the level of prestigious international institutions and include it in recognized global rankings. It also seeks excellence in delivering educational, research, and community services locally, regionally, and internationally in all physical sciences. This will be achieved by:

- Providing students with fundamental principles and concepts in general and medical physics.
- Offering high-quality courses that equip students with excellent knowledge and professional skills.
- Continuously using modern technologies in the field of physics.
- Providing students with the necessary knowledge to apply what they have studied in hospitals, particularly in diagnosing cancer and other diseases.
- Developing students' scientific and intellectual personalities.
- Preparing outstanding graduates with scientific thinking and research skills to pursue postgraduate studies, teaching, and compete in the job market.
- Conducting continuous improvement.

2. Program Mission

The program's mission is to prepare students professionally and academically through a scientific program that focuses on student needs for education, learning, and developing one of the college's main goals: to qualify students academically and scientifically in a way that aligns with the evolving requirements of basic and medical sciences.

These sciences are considered the cornerstone of other disciplines and the basis of global scientific and cognitive development. The program also aims to graduate pioneering scientific and leadership competencies in general and medical physics, and to contribute to scientific research in physics to serve local, regional, and international communities and sectors like health and education.

The department's core functions rely on three pillars:

- Educational Process: Providing an excellent learning environment and empowering students with knowledge to develop their intellectual capabilities and make them responsible in society, especially in scientific and practical matters.
- Scientific Research: Promoting research by engaging faculty members and students in conducting physics research and spreading knowledge to support community development.
- Community Service

3. Program Objectives

- Enhancing the quality of graduates by achieving comprehensive quality standards.
- Developing innovative and updated educational programs that prepare graduates to meet the needs of the knowledge society and job market.
- Providing students with fundamental knowledge and skills in general and medical physics.
- Advancing scientific research and qualifying scientific and professional competencies to conduct outstanding research.
- Serving societal institutions through effective partnerships.
- Partnering with reputable research centers and international universities.
- Attracting distinguished academic and administrative talents.
- Developing student skills to meet graduation requirements.
- Providing counseling to students in three main areas: psychological, academic, and professional.
- Ensuring laboratory training that enables graduates to acquire the highest levels of skills and professionalism required in the labor market.

- Activating mechanisms to communicate with graduates and support them through the Career Development and Employment Unit.

4. Program Accreditation

Currently under development and improvement toward ABET accreditation and completion of the self-assessment report.

5. Other external influences

Non

6. Program Structure

Program Structure	Number of Courses	Credit hours	Percentage	Reviews*
Institution Requirements	General Physics = 1	2	%٢	عدد وحدات الفيزياء العامة المطلوبة ١٣٥
	Medical Physics 3rd only = 1	2		
College Requirements	General Physics = 2	2	3%	
	Medical Physics 3rd only = 0	4		
Department Requirements	General Physics = 56	83	62%	
	Medical Physics 3rd only = 8	20	51%	
Summer Training	Yes			

Other				

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

7. Program Description

Year/Level	Course Code	Course Name	Credit Hours	
			theoretical	practical
General physics Level thee first semester 2024-2025	GO3101	Geometric Optics	2	2
	LP3102	Laser Physics (1)	2	2
	QM3103	Quantum Mechanics (1)	2	2
	MP3104	Materials Physics (1)	2	0
	NA3105	Numerical Analysis	2	2
	EN3106	English Language (3)	2	2
		Elective (2)	2	2
General physics Level thee second semester 2024-2025	PO3201	Physical Optics	٢	٢
	LP3202	Laser Physics (2)	٢	٢
	QM3203	Quantum Mechanics (2)	-	٢
	MP3204	Materials Physics (2)	٢	٢
	MP3205	Molecular Physics	-	٢
	MP3205	Mathematics (5)	٢	٢
	PP3206	Spectra	-	٢
		Elective (2)	-	٢
Medical physics Level thee First semester 2024-2025	MPA311	Anatomy	2	2
	MPPA312	Medical Physics (1)	2	2
	MPDRA313	Diagnostic Radiology Physics (1)	2	–
	MPO314	Optics (Engineering Physics)	2	2
	MPDRA315	Radiation Protection	2	–
	MPMP316	Materials Physics	2	2
	MPE317	English Language (3)	2	
	MPBSA318	Biostatistics	2	

Medical physics Three level Second semester 2024-2025	MPP321	**Physiology**	٢	٢
	MPP322	**Medical Physics**	٢	٢
	MPRD323	**Diagnostic Radiology Physics**	٢	٢
	MPLM324	**Lasers in Medicine**	٢	٢
	MPMB325	**Biomaterials**	٢	٢
	MPQM326	**Quantum Mechanics**	٢	-
	MPHE327	**Health Electronics**	٢	-
General physics Fourth Level First semester 2024-2025	NP4101	**Nuclear Physics (1)**		
	SSP4102	**Solid State Physics (1)**	2	٣
	ET4103	**Electromagnetic Theory (1)**	٢	٢
	MP4104	**Mathematical Physics (1)**	٢	-
	NS4105	**Nanoscience**	٢	-
	EP4106	**English Language (4)**	٢	-
	OP4107	**Elective (3)**	٢	-
	RP4108	**Research Project**	٢	-
General physics Fourth Level Second semester 2024-2025	**NP4201**	**Nuclear Physics (2)**		
	SSP4202	**Solid State Physics (2)**	٢	٢
	ET4203	**Electromagnetic Theory (2)**	٢	٢
	MP4204	**Mathematical Physics (2)**	٢	-
	PP4205	**Plasma Physics**	٢	-
	BP4206	**Life Physics**	٢	-
	NP4207	**Mathlabs**	٢	-
	NP4208	**Research Project**	٢	-
			٢	-
Medical physics Fourth Level First semester 2024-2025	MPMI411	Medical Devices (1)		
	MBRB412	Radiation Biology	٢	٢
	MPPM413	Nuclear Medicine Physics	٢	-
	MPIP414	Image Processing	٢	٢
	MPE415	English	٢	٢
	MPRP416	Research Project	٢	-
	MPMI411	Optional (3)	٢	-

			٢	-
Medical physics Fourth Level Second semester 2024-2025	**MPMI411**	Medical Devices (1)	٢	-
	PMPR421	Therapeutic Radiophysics	٢	٢
	PMP422	Health Physics	٢	٢
	PMB423	Biophysics	٢	-
	PMNM425	Nanoscience in Medicine	٢	-
	PMET426	Electromagnetic Theory in Medicine	٢	-
	MPRP427	Research Project	٢	-
	MPMI411	Optional (4)	٢	-

8. Expected learning outcomes of the program

Knowledge	
• Communicating with everything new and useful and investing it in developing the student's conceptual side.	• By introducing students to the basic concepts of general physics and medical physics, thus serving the community in the medical and health sectors and educational institutions.
Skills	
• Preparing specialized cadres in general physics and medical physics to support the country's industrial and research movement.	• Follow up on graduating students through the Rehabilitation and Employment Unit and identify graduating students and the extent to which they benefited from their studies in the academic program to consolidate local and international academic accreditation.
• The ability to understand general and medical physics and apply it theoretically and practically. • Dealing with physics crises and problems through practical experiments and the use of theoretical models.	• Acquire computer skills and basic software for analyzing physical data, such as the Mathlab program and Excel program.

• Building mathematical and quantitative foundations for students in the Department of General and Medical Physics	
Ethics	
The importance of values in the Physics Bachelor's program	• Guiding behavior: Values help students understand what is expected of them academically and ethically. • Building identity: Contributing to the development of a well-rounded and balanced student personality. • Achieving excellence: Motivating students to achieve their goals in a manner consistent with human and professional values.
Giving students an incentive to volunteer	• Organize group-based activities, such as projects or workshops. • Assign roles among students to ensure everyone's participation. • Discuss ideas in small groups and then present them to the entire class.
Creating an environment that stimulates expression	• Create a safe classroom environment that encourages free expression without fear of criticism. • Allocate regular time for open discussions on a variety of topics. • Respect students' opinions, no matter how different.
Using creative thinking techniques	• Apply exercises such as brainstorming to solve problems. • Use mind mapping techniques to organize ideas.

9. Teaching and Learning Strategies

• Reports and research

• Questions and answers

• Classroom participation

• Lectures: Presenting knowledge through direct explanation by the professor, which are effective for introducing new information.

• Directive teaching: Providing clear instructions and specific steps to achieve specific goals.

• Cooperative Learning: Dividing students into small groups to work on a shared task.

• Brainstorming: Encouraging students to generate new and innovative ideas on a specific topic.

• Inquiry-Based Learning: Encouraging students to ask questions and seek answers on their own.

• Project-Based Learning: Working on practical projects aimed at solving a problem or designing a product.

• Self-Directed Learning: Giving students the freedom to take responsibility for their own learning and choose resources and activities.

• Blended Learning: Combining traditional education with e-learning.

• Online Learning: Using online educational platforms to deliver lessons.

• Gamification: Using games to motivate students and enhance engagement.

10. Evaluation methods

• Tests: These include essay questions, true/false questions, a midterm exam, and a final exam.

• Reports: Students are asked to write reports on specific topics, which helps develop research and analytical skills.

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• Final Exams: Final exams are often comprehensive and cover all semester material.

• College assignments

• Homework

Among the success factors of our academic program are:

• Clear assessment criteria.

• A variety of methods to suit different learning styles.

• Providing effective feedback to improve performance.

11.Faculty

Faculty Members

Academic Rank	Specialization		Special Requirements/Skills (if applicable)		Number of the teaching staff	
	General	Special			Staff	Lecturer
Prof. Dr. Subaih Jassim Katea Kattan Al Shammari	Physics	Solid State			staff	Lecturer
Prof. Dr. Ahmed Hashim Aboud Awda Joda Al Shaheen	Physics	Microwave Antennas			staff	Lecturer
Assistant Professor Dr. Ahmed Khalaf Zughair Hassan Al Saadi	Computers	Artificial Intelligence			staff	Head of Department
Assistant Professor Dr. Munther Abdul Hassan Khudair Abbas	Physics	Nanomaterials			staff	Lecturer
Assistant Professor Dr. Diaa Badr Habash Awda Al Ameri	Physics	Solid State			staff	Lecturer
Assistant Professor Dr. Zahraa Abdul Hussein Ismail Maala	Physics	Nuclear and Environment			staff	Lecturer
Assistant Professor Dr. Baqer Obaid Thaban Nemah Al Awda	Physics	Nano Optics			staff	Department Rapporteur
Assistant Professor Dr. Ahmed Shihab Ahmed Hadi Al Jazairi	Laser Physics	Laser Interaction with Auction			staff	Lecturer
Assistant Professor Dr. Mohammed Hashim Mohammed Faraj	General Physics	Medical Image Processing Physics			staff	Lecturer
Assistant Professor Dr. Dalia Khaled Nasser Hayat Al Hussaini	Physics	Medical Physics			staff	Lecturer
Eng. Mayada Jassim Mohammed Jaber Al Shuroei	Physics	Nanophysics			staff	Lecturer
Eng. Zainab Saad Karam Al Bakhati	Computers	Computer Networks			staff	Lecturer
Eng. Muslim Eidan Hamel Dakhel Al Saadi	Physics	Nanotechnology			staff	Lecturer
Eng. Alaa Hussein Kamel Hafez Al Saadi	Physics	Upper Atmosphere			staff	Lecturer
Eng. Murtada Mohammed Abdul Redha Jassim	Engineering	Environment and Pollution			staff	Lecturer
Eng. Hussein Saadoun Mashloush Al Ghanami	Physics	Solid State			staff	Lecturer

Eng. Khamail Ibrahim Abdul Wahid Qasim Al Saadi	Physics	Materials			**staff**	Lecturer
Eng. Hassan Suwadi Taresh Mohsen Al-Furaiji	Computers	Data Technology			**staff**	Lecturer
Assistant Professor Baha' Al-Din Qasim Ali Al-Bahadli	Physics	General Physics			**staff**	Lecturer
Assistant Professor Mohammed Jawad Kazim Ali Al-Jarrah	Physics	Medical Physics			**staff**	Lecturer

Professional Development

Mentoring new faculty members

1. Academic and Administrative Guidance

• Guiding them on the use of e-learning systems and classroom management.

• Providing workshops on modern teaching methods and academic assessment.

• Introducing them to available learning resources, such as digital libraries and databases.

• Explaining academic publishing procedures and scientific research ethics.

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• Providing them with a lecture schedule.

• Informing them of the annual assessment, which they should review.

Professional development of faculty members

Professional development for faculty members is an essential component of enhancing the quality of higher education and scientific research. It aims to improve academic, research, and teaching skills to ensure they keep pace with the latest developments in their various fields. The following are the most important areas of professional development:

• Workshops and training courses on modern teaching strategies, active learning, and effective assessment.

• Using technology in education.

• Designing curricula and courses according to the latest academic standards.

• Strengthening academic leadership to prepare faculty members for administrative positions.

• Developing administrative skills in strategic planning, team management, and academic decision-making.

• Enhancing academic supervision and student counseling skills.

• Understanding university policies and the roles of academic and administrative committees.

• Academic visits and knowledge exchange with other universities and educational institutions.

• Financial support for research and conferences is expected.

12. Acceptance Criterion

There are general criteria adopted by most universities when accepting students into various colleges and departments, as follows:

Undergraduate Studies:

1. GPA based on subjects (Chemistry, Mathematics, and Physics)

2. Interview

3. Medical Examination

Postgraduate Studies:

Academic GPA:

• Higher Diploma and Master's: The applicant's GPA must be no less than 65%.

• Doctorate: The minimum GPA is 70%.

Employment Experience:

• Doctorate: The applicant must have at least two years of actual employment after their last degree, fully dedicated to their studies.

Competitive Examination:

• All applicants are required to pass a competitive exam, the date of which is set by the Ministry.

• English Language: Applicants may be required to submit English language proficiency certificates, such as tests administered at the computer center, announced annually by the university.

13. The most important sources of information about the program

1. Popular undergraduate physics textbooks such as:

• University Physics by Young and Freedman.

• Fundamentals of Physics by Halliday, Resnick, and Walker.

• Physics for Scientists and Engineers by Serway and Jewett.

2. Videos and video lectures

• Educational channels on platforms such as:

• YouTube: Channels such as MinutePhysics, Veritasium, and Physics Girl.

• Comprehensive books on medical physics:

• "Introduction to Physics in Modern Medicine" by Suzanne Amador Kane:

• Provides an overview of physics applications in medicine.

• "The Essential Physics of Medical Imaging" by Jerrold T. Bushberg et al.

• Courses on platforms such as:

• Courses such as Introduction to Medical Imaging.

• EdX: Courses covering medical physics.

• YouTube channels:

• Radiology Tutorials: Focuses on imaging fundamentals and techniques.

• Medical Physics Education: Provides educational videos in various branches of medical physics.

14. Program Development Plan

Curriculum Development

• A. Updating Academic Content

• Reviewing current courses to ensure they are in line with recent developments in physics.

• Introducing advanced courses covering modern topics such as:

• Applied Quantum Physics

• Nanoscience

• Medical Physics

• Materials Physics

• Computational Physics

• B. Focusing on Practical and Applied Aspects

• Enhancing the practical aspect of courses through advanced laboratories.

• Offering elective courses relevant to the job market such as:

• Industrial Physics

• Optical and Electronic Device Design

• C. Integrating Interdisciplinary Skills

• Adding courses aimed at developing soft skills such as:

• Critical Thinking

• Teamwork

• Presentation and Communication Skills

• Providing modern laboratories equipped with advanced equipment such as:

• Precision Measuring Instruments

• Simulation of Physical Phenomenons

• Virtual Reality Applications for Scientific Experiments

• B. Improving Technological Resources

2. Providing students with computational physics programs such as:

• MATLAB

Developing an electronic library containing up-to-date references and scientific journals.

3. Faculty Development

• Organizing workshops and training programs for faculty members to keep up with the latest teaching methods.

• Encouraging faculty members to participate in international research and conferences.

• Increasing cooperation with universities and research institutions to exchange expertise.

4. Promoting Scientific Research

• Incorporating small research projects for students into the curriculum.

• Establishing partnerships with research centers and industries to provide training opportunities and applied research projects.

• Encouraging students to publish their research in scientific journals.

5. Building Relationships with the Labor Market

• Establishing partnerships with companies and institutions to identify labor market requirements.

• Providing internship opportunities for students.

• Offering seminars and workshops on the practical applications of physics in various sectors.

6. Improving Assessment Mechanisms

• Introducing continuous assessment to measure student performance throughout the semester.

• Implementing assessment systems based on projects and research rather than solely on examinations.

• Organizing periodic reviews of teaching quality based on student and employer feedback.

Program Skills Outline

Year/Level	Course Code	Course Name	Basic or optional	Required program Learning outcomes											
				Knowledge				Skills				Ethics			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C 4
General physics First level First semester 2024–2025	SCI1101	Computer Programming 1	Basic	√	√	√	√	√	√	√	√	√	√	√	√
	PHY1102	Electrical Engineering	Basic	√	√	√	√	√	√	√	√	√	√	√	√
	PHY1101	Mechanics and Material Properties 1	Basic	√	√	√	√	√	√	√	√	√	√	√	√
	UNI1102	Arabic Language	Basic	√	√	√	√	√	√	√	√	√	√	√	√
	PHY1103	Mathematics 1	Basic	√	√	√	√	√	√	√	√	√	√	√	√
	UNI1101	Human Rights and Democracy	Basic	√	√	√	√	√	√	√	√	√	√	√	√
General physics	PHY1202	Magnetism	Basic	√	√	√	√	√	√	√	√	√	√	√	√
	PHY1200	Democracy	Basic	√	√	√	√	√	√	√	√	√	√	√	√

First level Second semester 2024–2025	PHY1201	Mechanics and Properties of Matter (2)	Basic	√	√	√	√	√	√	√	√	√	√	√	√
	UNI1202	General Astronomy	Basic	√	√	√	√	√	√	√	√	√	√	√	√
	PHY1203	Mathematics (2)	Basic	√	√	√	√	√	√	√	√	√	√	√	√
	SCI1204	Computers (2)	Basic	√	√	√	√	√	√	√	√	√	√	√	√
	PHY1205	English Language (1)	Basic	√	√	√	√	√	√	√	√	√	√	√	√
General physics Second level first semester 2024–2025	HT2104	Heat and Thermodynamics	Basic	√	√	√	√	√	√	√	√	√	√	√	√
	AM2105	Analytical Mechanics (1)	Basic	√	√	√	√	√	√	√	√	√	√	√	√
	PHY2108	Analog Electronics	Basic	√	√	√	√	√	√	√	√	√	√	√	√
	MA2101	Mathematics (3)	Basic	√	√	√	√	√	√	√	√	√	√	√	√
	UOM 202	English (2)	Basic	√	√	√	√	√	√	√	√	√	√	√	√
	UOM 122	Computers (3)	Basic	√	√	√	√	√	√	√	√	√	√	√	√
	UOM2106	Arabic	Basic	√	√	√	√	√	√	√	√	√	√	√	√
	PHY2201	Modern Physics (2)	basic	√	√	√	√	√	√	√	√	√	√	√	√

General physics Second level Second semester 2024-2025	AM2202	Analytical Mechanics (2)	basic	√	√	√	√	√	√	√	√	√	√	√	√
	PHY2203	Thermodynamics and Statistics (2)	basic	√	√	√	√	√	√	√	√	√	√	√	√
	PHY2204	Digital Electronics	basic	√	√	√	√	√	√	√	√	√	√	√	√
	PHY2205	Sound and Wave Motion	basic	√	√	√	√	√	√	√	√	√	√	√	√
	UOM 201	Computers (4)	basic	√	√	√	√	√	√	√	√	√	√	√	√
	MNS120	Crimes of the Ba'ath Party	basic	√	√	√	√	√	√	√	√	√	√	√	√
General physics Third level First semester 2024-2025	GO3101	Geometric Optics	basic	√	√	√	√	√	√	√	√	√	√	√	√
	LP3102	Laser Physics (1)	basic	√	√	√	√	√	√	√	√	√	√	√	√
	QM3103	Quantum Mechanics (1)	basic	√	√	√	√	√	√	√	√	√	√	√	√
	MP3104	Materials Physics (1)	basic	√	√	√	√	√	√	√	√	√	√	√	√
	NA3105	Numerical Analysis	basic	√	√	√	√	√	√	√	√	√	√	√	√
	EN3106	English Language (3)	basic	√	√	√	√	√	√	√	√	√	√	√	√
General physics Third level Second semester	LP3202	Laser Physics (2)	basic	√	√	√	√	√	√	√	√	√	√	√	√
	QM3203	Quantum Mechanics (2)	basic	√	√	√	√	√	√	√	√	√	√	√	√
	MP3204	Materials Physics (2)	basic	√	√	√	√	√	√	√	√	√	√	√	√
	MP3205	Molecular Physics	basic	√	√	√	√	√	√	√	√	√	√	√	√
	MP3205	Mathematics (5)	basic	√	√	√	√	√	√	√	√	√	√	√	√
	PP3206	Spectra	basic	√	√	√	√	√	√	√	√	√	√	√	√

2024–2025	3207	Elective (2)	Elective	√	√	√	√	√	√	√	√	√	√	√	√
Medical physics Third level First semester 2024–2025	MPA311	Anatomy	basic	√	√	√	√	√	√	√	√	√	√	√	√
	MPPA312	Medical Physics (1)	basic	√	√	√	√	√	√	√	√	√	√	√	√
	MPDRA313	Diagnostic Radiology Physics (1)	basic	√	√	√	√	√	√	√	√	√	√	√	√
	MPO314	Optics (Engineering Physics)	basic	√	√	√	√	√	√	√	√	√	√	√	√
	MPDRA315	Radiation Protection	basic	√	√	√	√	√	√	√	√	√	√	√	√
	MPMP316	Materials Physics	basic	√	√	√	√	√	√	√	√	√	√	√	√
	MPE317	English Language (3)	basic	√	√	√	√	√	√	√	√	√	√	√	√
	MPBSA318	Biostatistics	Elective	√	√	√	√	√	√	√	√	√	√	√	√
Medical physics Third level Second semester 2024–2025	NP4201	Nuclear Physics (2)	basic	√	√	√	√	√	√	√	√	√	√	√	√
	SSP4202	Solid State Physics (2)	basic	√	√	√	√	√	√	√	√	√	√	√	√
	ET4203	Electromagnetic Theory (2)	basic	√	√	√	√	√	√	√	√	√	√	√	√
	MP4204	Mathematical Physics (2)	basic	√	√	√	√	√	√	√	√	√	√	√	√
	PP4205	Plasma Physics	basic	√	√	√	√	√	√	√	√	√	√	√	√
	BP4206	Biophysics	basic	√	√	√	√	√	√	√	√	√	√	√	√
	NP4207	Mathlabs	basic	√	√	√	√	√	√	√	√	√	√	√	√

	NP4208	Research Project	basic	√	√	√	√	√	√	√	√	√	√	√	√
General physics Fourth level first semester 2024–2025	ET4203	Electromagnetic Theory (2)	basic	√	√	√	√	√	√	√	√	√	√	√	√
	MP4204	Mathematical Physics (2)	basic	√	√	√	√	√	√	√	√	√	√	√	√
	PP4205	Plasma Physics	basic	√	√	√	√	√	√	√	√	√	√	√	√
	BP4206	Biophysics	basic	√	√	√	√	√	√	√	√	√	√	√	√
	NP4207	What is it?	basic	√	√	√	√	√	√	√	√	√	√	√	√
	NP4208	Research Project	basic	√	√	√	√	√	√	√	√	√	√	√	√
	ET4203	Electromagnetic Theory (2)	basic	√	√	√	√	√	√	√	√	√	√	√	√
General physics Fourth level Second semester 2024–2025	NP4201	Nuclear Physics (2)	basic	√	√	√	√	√	√	√	√	√	√	√	√
	SSP4202	Solid State Physics (2)	basic	√	√	√	√	√	√	√	√	√	√	√	√
	ET4203	Electromagnetic Theory (2)	basic	√	√	√	√	√	√	√	√	√	√	√	√
	MP4204	Mathematical Physics (2)	basic	√	√	√	√	√	√	√	√	√	√	√	√
	PP4205	Plasma Physics	basic	√	√	√	√	√	√	√	√	√	√	√	√
	BP4206	Biophysics	basic	√	√	√	√	√	√	√	√	√	√	√	√
	NP4207	Mathlabs	basic	√	√	√	√	√	√	√	√	√	√	√	√
	NP4208	Research Project	basic	√	√	√	√	√	√	√	√	√	√	√	√
Medical physics	MPMI411	Medical Devices (1)	basic	√	√	√	√	√	√	√	√	√	√	√	√
	MBRB412	Radiation Biology	basic	√	√	√	√	√	√	√	√	√	√	√	√

Fourth level First semester 2024–2025	MPPM413	Nuclear Medicine Physics	basic	√	√	√	√	√	√	√	√	√	√	√	√
	MPIP414	Image Processing	basic	√	√	√	√	√	√	√	√	√	√	√	√
	MPE415	English	basic	√	√	√	√	√	√	√	√	√	√	√	√
	MPRP416	Research Project	basic	√	√	√	√	√	√	√	√	√	√	√	√
		Optional (3)	Elective	√	√	√	√	√	√	√	√	√	√	√	√
Medical physics Fourth level Second semester 2024–2025	MPMI411	Medical Devices (1)	basic	√	√	√	√	√	√	√	√	√	√	√	√
	PMPR421	Therapeutic Radiophysics	basic	√	√	√	√	√	√	√	√	√	√	√	√
	PMP422	Health Physics	basic	√	√	√	√	√	√	√	√	√	√	√	√
	PMB423	Biophysics	basic	√	√	√	√	√	√	√	√	√	√	√	√
	PMNM425	Nanoscience in Medicine	basic	√	√	√	√	√	√	√	√	√	√	√	√
	PMET426	Electromagnetic Theory in Medicine	basic	√	√	√	√	√	√	√	√	√	√	√	√
	MPRP427	Research Project	basic	√	√	√	√	√	√	√	√	√	√	√	√
		Optional (4)	Elective	√	√	√	√	√	√	√	√	√	√	√	√

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

Module Information
معلومات المادة الدراسية

Module Title	Medical physiology	**Module Delivery**	
Module Type	Core	☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code			
ECTS Credits	6		
SWL (hr/sem)	150		

Module Level		**Semester of Delivery**	
Administering Department		**College**	
Module Leader	Zainab AbdulJabbar Ridha Al-Ali	**e-mail**	Zainab-alali@uomisan.edu.iq
Module Leader's Acad. Title	Professor	**Module Leader's Qualification**	Ph. D.
Module Tutor	Non	**e-mail**	E-mail
Peer Reviewer Name	Non	**e-mail**	E-mail
Scientific Committee Approval Date		**Version Number**	

Relation with other Modules
العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	**Semester**	
Co-requisites module	N0ne	**Semester**	

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

Module Aims أهداف المادة الدراسية	1.To provide students with an understanding of the structure and function of a number of key physiological systems and their role in body homeostasis. 2.To study the physiology of humans as a model for physiological processes in other organisms. 3.To describe a range of tissues and physiological processes in humans at an introductory level. 4.To relate physiological processes to their bases at cellular levels. 5.To be able to understand and analyses experimental work in physiology. 6.To be able to apply problem-solving skills to practical problems in physiology, including the use of mathematics and data analysis. 7.To develop further practical biological skills introduced in this Physiology course.

Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1.Introductory knowledge of the cellular and biochemical processes which underlyingphysiological processes in humans. 2.Demonstrate an understanding of special mechanisms used to transport selectedmolecules unable to cross the plasma membrane on their own: carrier mediated;endocytosis; exocytosis. 3.Describe the anatomy, physiology and control of a number of key physiologicalsystems critical for the functioning of the human body. 4.Basic knowledge of communications between cells is largely by extra cellular chemical messengers: paracrine, neurotransmitters and neurohormones. 5.Explain principles and solve problems in human physiology. 6.Introductory-level knowledge of physiology of major processes, such as cardiovascular system, nervous system, digestive system, respiratory system, endocrinology and reproductive system in human . 7.Demonstrate an understanding of levels of organization of key physiological systems from cells to function. 8.Basic knowledge to perform, analyses and report on experiments and observations in physiology 9.Relate knowledge of physiological systems above to selected homeostatic mechanisms and their control. 10.Recognize the principal tissue structures to understanding of key physiological systems.
Indicative Contents المحتويات الإرشادية	Theory Lectures Learning concepts of each theoretical lecture or groups of lectures. Lab. Lectures Learning concepts of each laboratory lecture or groups of lectures.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Lectures: In traditional lecture-based courses, instructors deliver content to students throughspoken presentations. This format is often supplemented with slides, multimedia, or handoutsto aid understanding. •Workshops: Workshops enhance the knowledge and understanding of the subject gainedfrom lectures and develop fundamental and subject-specific skills. •Self-guided learning contributes to subject-specific knowledge and self-motivation. •The examinations demonstrate achievement of the appropriate level of subject-specific knowledge of physiology, with an emphasis on understanding and communication (essay and problem-based questions) or recall of factual knowledge (multiple choice or short answerquestion tests) •Tutorials: Tutorials are small-group sessions led by a tutor, where students can ask questions,receive individualized support, and clarify concepts covered in lectures or readings. •Practical analysis based on subject-specific knowledge and demonstrate subject-specificskills in understanding experimental work and data analysis. •Practical exercises allow students to utilize subject-specific knowledge gained from lectures,and support the development of key and subject-specific skills. •Flipped classroom: In a flipped classroom model, students are introduced to course materialthrough self-paced learning activities outside of class (e.g., watching pre-recorded lectures orreading texts), freeing up class time for interactive discussions, problem-solving, and hands-onactivities.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem.) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.3
Unstructured SWL (h/sem.) الحمل الدراسي غير المنتظم للطالب خلال الفصل	71	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.7
Total SWL (h/sem.) الحمل الدراسي الكلي للطالب خلال الفصل	150		

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to cell physiology
Week 2	The general and cellular basis of medical physiology
Week 3	Cardiovascular system: Function, organs and diseases
Week 4	Generation and conduction of the cardiac impulse
Week 5	Physiology of the nervous system I
Week 6	Physiology of the nervous system II
Week 7	Mid. Exam
Week 8	Muscle physiology
Week 9	Renal physiology Week

Week 10	Digestive system I: Structures and tissues
Week 11	Digestive system II : Digestion and absorption
Week 12	The Anatomy and Physiology of the respiratory system
Week 13	Endocrinology I
Week 14	Endocrinology I I
Week 15	Heat regulation
Week 16	Final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	General laboratory rules and safety procedures
Week 2	Introduction to blood physiology.
Week 3	Hemoglobin estimation
Week 4	Packed cell volume (PCV)
Week 5	Total R.B.C. count
Week 6	Total W.B.C. count
Week 7	Differential WBC count
Week 8	Erythrocyte sedimentation rate (ESR)
Week 9	Clotting and bleeding time
Week 10	ABO blood groups
Week 11	Blood pressure.
Week 12	Experiments on respiratory system
Week 13	Insulin regulation of blood glucose
Week 14	Electrocardiogram (ECG).
Week 15	Exam

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

Required Texts	Ganong's review of medical physiology (2019).KimE.Barrett,Susan M.Barman, HeddwenL.Brooks and Jason Yuan.,26th edition, McGraw Hill education.	Online
Recommended Texts	Medical physiology (2009) .Jonathan D.Kibble and Colby R. Halsey , McGraw Hill medical.	Online
Websites	Website Address.	

Grading Scheme
مخطط الدرجات

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

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

Module Information
معلومات المادة الدراسية

Module Title	**Optics physics**	**Module Delivery**	
Module Type	**Core**	☒ **Theory**	
Module Code	**PHY32023**	☒ **Lecture**	
ECTS Credits	**5**	☒ **Lab**	
SWL (hr/sem)	**150**	☒ **Tutorial**	
		☐ **Practical**	
		☐ **Seminar**	
Module Level	UGx11 UGIV	**Semester of Delivery**	7
Administering Department	Bachelor's degree in Physics (First cycle)	**College**	College of science

Module Leader	Dr. Baqer Obaid al-Nashy	**e-mail**	baqernano@uomisan.edu.iq
Module Leader's Acad. Title	Ass. Professor	**Module Leader's Qualification**	Ph.D.
Module Tutor	Name (if available)	**e-mail**	E-mail
Peer Reviewer Name	Name	**e-mail**	E-mail
Scientific Committee Approval Date	01/06/2023	**Version Number**	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

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

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	Describe polarization and the properties of polarizing components - describe the concept of quantum nature of light and discuss the limitations of classical optics, This course will introduce the modern optics beginning with a description electromagnetic radiation and the use of Fourier techniques to describe optical systems. A central theme is a description of phase and coherence that enables a discussion of applications of modern optics including interference, diffraction and polarisation, by introducing interferometers, interference in multilayer films, diffracting gratings, holography, and confocal microscope.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	After the course, the student should be able to **Module learning outcomes** Qualitatively describe the Hungens-Fresnel principle and Kirchhoff diffraction theory Qualitatively describe the diffraction pattern using Fourier techniques

	• Understand the principle of interferometers; be able to determine interference - fringes. • Understand the principle of antireflection coating; be able to design and analyse multi-layer antireflection systems. • Understand the principal of a cavity and be able to describe the operation of a Fabry-Perot interferometer • Understand the Gabor's analytical method of holography; determine configurations of formation and reconstruction of a hologram • Understand principle of diffraction grating; determine diffraction patterns, resolving - power, and spectrums by diffraction gratings.
Indicative Contents المحتويات الإرشادية	The course introduces k-space (wave vector space) and the reciprocal lattice with its applications, which are central concepts for further studies within solid state physics. In addition, the course gives an overview of different models to describe the properties of solid materials. The syllabus is as follows 1. Classification of solid material, atomic binding 2. Crystalline materials, lattice vectors, unit cells 3. Reciprocal space, Brillouin zones 4. X-ray diffraction, Bragg's law, von Laue equations 5. Lattice vibrations, phonons, heat capacity 6. Free electron model, resistance in metals, Hall effect 7. Band structure, Bloch wave functions, introduction to band structure calculations 8. Semiconductors, metals, superconductivity and magnetism

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

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	71	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	**The propagation of Light** 2.1 One-Dimensional Waves 2.2 Harmonic Waves 2.3Phase and Phase Velocity
Week 2	2.4 The Superposition Principle 2.5 The Complex Representation 2.6 Phasors and the Addition of Waves
Week 3	**2.1 Plane Waves**

	2.2 The Three-Dimensional Differential Wave Equation 2.3 Spherical Waves 2.4 Cylindrical Waves
Week 4	**3. The Nature of Polarized Light Polarizers** 3.1 Dichroism 3.2 Birefringence 3.3 Scattering and Polarization
Week 5	3.4 Polarization by Reflection 3.5 Retarders 3.6 Circular Polarizers 3.7 Polarization of Polychromatic Light
Week 6	**4 Optical Activity** 4.1 Induced Optical Effects—OpticalModulators 380 4.2 Liquid Crystals 384 4.3 A Mathematical Description of Polarization 387
Week 7	**Mid-term Exam**
Week 8	**4.4 interference** 4.5 General Considerations 4.6 Conditions for Interference 4.7 Wavefront-Splitting Interferometers
Week 9	4.8 Amplitude-Splitting Interferometers 4.9 Types and Localizationof Interference Fringes
Week 10	4.10 Multiple-Beam Interference 4.11 Multiple-Beam Interference 4.12 Applications of Single and Multilayer Films
Week 11	**5. Diffraction** 5.1 Preliminary Considerations 457 **5.2** Fraunhofer Diffraction 465 **5.3** Fresnel Diffraction 505
Week 12	**5.4** Kirchhoff's Scalar Diffraction Theory 532 **5.5** Boundary Diffraction Waves 535
Week 13	**6. Basics of coherence theory** **6.1** Introduction 6.2 Fringes and Coherence **6.3**Visibility
Week 14	6.6 Coherence and Stellar Interferometry

Week 15	**7. Fourier Optics** **7.1** Fourier Transforms 7.2 Optical Applications
Week 16	7.3 The Spatial Distribution of Optical 7.4 Information 7.5 Holography 7.6 Nonlinear Optics

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

Week	Material Covered
Week 1	Lab 1:
Week 2	Lab 2:
Week 3	Lab 3:
Week 4	Lab 4:
Week 5	Lab 5:
Week 6	Lab 6:
Week 7	Lab 7:

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts		No
Recommended Texts		No
Websites		

Grading Scheme

مخطط الدرجات

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

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

Module Information
معلومات المادة الدراسية

Module Title	Nanoscience in medicine	**Module Delivery**	
Module Type	Core	☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code			
ECTS Credits	6		
SWL (hr/sem)	150		

Module Level		**Semester of Delivery**	
Administering Department		**College**	
Module Leader	Zainab AbdulJabbar Ridha Al-Ali	**e-mail**	Zainab-alali@uomisan.edu.iq
Module Leader's Acad. Title	Professor	**Module Leader's Qualification**	Ph. D.
Module Tutor	Non	**e-mail**	E-mail
Peer Reviewer Name	Non	**e-mail**	E-mail
Scientific Committee Approval Date		**Version Number**	

Relation with other Modules
العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	**Semester**	

Co-requisites module	N0ne	Semester	

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

Module Aims أهداف المادة الدراسية	1.To provide students with an understanding of the structure and function of a number of key physiological systems and their role in body homeostasis. 2.To study the physiology of humans as a model for physiological processes in other organisms. 3.To describe a range of tissues and physiological processes in humans at an introductory level. 4.To relate physiological processes to their bases at cellular levels. 5.To be able to understand and analyses experimental work in physiology. 6.To be able to apply problem-solving skills to practical problems in physiology, including the use of mathematics and data analysis. 7.To develop further practical biological skills introduced in this Physiology course.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1.Introductory knowledge of the cellular and biochemical processes which underlyingphysiological processes in humans. 2.Demonstrate an understanding of special mechanisms used to transport selectedmolecules unable to cross the plasma membrane on their own: carrier mediated;endocytosis; exocytosis. 3.Describe the anatomy, physiology and control of a number of key physiologicalsystems critical for the functioning of the human body. 4.Basic knowledge of communications between cells is largely by extra cellular chemical messengers: paracrine, neurotransmitters and neurohormones. 5.Explain principles and solve problems in human physiology. 6.Introductory-level knowledge of physiology of major processes, such as cardiovascular system, nervous system, digestive system, respiratory system, endocrinology and reproductive system in human . 7.Demonstrate an understanding of levels of organization of key physiological systems from cells to function. 8.Basic knowledge to perform, analyses and report on experiments and observations in physiology 9.Relate knowledge of physiological systems above to selected homeostatic mechanisms and their control. 10.Recognize the principal tissue structures to understanding of key physiological systems.

Indicative Contents المحتويات الإرشادية	Theory Lectures Learning concepts of each theoretical lecture or groups of lectures. Lab. Lectures Learning concepts of each laboratory lecture or groups of lectures.

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	Lectures: In traditional lecture-based courses, instructors deliver content to students throughspoken presentations. This format is often supplemented with slides, multimedia, or handoutsto aid understanding. •Workshops: Workshops enhance the knowledge and understanding of the subject gainedfrom lectures and develop fundamental and subject-specific skills. •Self-guided learning contributes to subject-specific knowledge and self-motivation. •The examinations demonstrate achievement of the appropriate level of subject-specific knowledge of physiology, with an emphasis on understanding and communication (essay and problem-based questions) or recall of factual knowledge (multiple choice or short answerquestion tests) •Tutorials: Tutorials are small-group sessions led by a tutor, where students can ask questions,receive individualized support, and clarify concepts covered in lectures or readings. •Practical analysis based on subject-specific knowledge and demonstrate subject-specificskills in understanding experimental work and data analysis. •Practical exercises allow students to utilize subject-specific knowledge gained from lectures,and support the development of key and subject-specific skills. •Flipped classroom: In a flipped classroom model, students are introduced to course materialthrough self-paced learning activities outside of class (e.g., watching pre-recorded lectures orreading texts), freeing up class time for interactive discussions, problem-solving, and hands-onactivities.

Student Workload (SWL)
الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem.) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.3
Unstructured SWL (h/sem.) الحمل الدراسي غير المنتظم للطالب خلال الفصل	71	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.7
Total SWL (h/sem.) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10(10%)	3,10	1,2,3,6,8,9,11
	Assignments	2	10(10%)	5,12	3,10
	Projects / Lab.	1	10(10%)		

	Report	1	10(10%)		7,12
Summative assessment	**Midterm Exam**	1	10(10%)	8	1-8
	Final Exam	1	50(50%)	16	1-14
Total assessment			100(100%)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to cell physiology
Week 2	The general and cellular basis of medical physiology
Week 3	Cardiovascular system: Function, organs and diseases
Week 4	Generation and conduction of the cardiac impulse
Week 5	Physiology of the nervous system I
Week 6	Physiology of the nervous system II
Week 7	Mid. Exam
Week 8	Muscle physiology
Week 9	Renal physiology Week
Week 10	Digestive system I: Structures and tissues
Week 11	Digestive system II : Digestion and absorption
Week 12	The Anatomy and Physiology of the respiratory system
Week 13	Endocrinology I
Week 14	Endocrinology I I
Week 15	Heat regulation
Week 16	Final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	General laboratory rules and safety procedures
Week 2	Introduction to blood physiology.
Week 3	Hemoglobin estimation
Week 4	Packed cell volume (PCV)
Week 5	Total R.B.C. count
Week 6	Total W.B.C. count
Week 7	Differential WBC count
Week 8	Erythrocyte sedimentation rate (ESR)
Week 9	Clotting and bleeding time
Week 10	ABO blood groups

Week 11	Blood pressure.
Week 12	Experiments on respiratory system
Week 13	Insulin regulation of blood glucose
Week 14	Electrocardiogram (ECG).
Week 15	Exam

earning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Ganong's review of medical physiology (2019).KimE.Barrett,Susan M.Barman, HeddwenL.Brooks and Jason Yuan.,26th edition, McGraw Hill education.	Online
Recommended Texts	Medical physiology (2009) .Jonathan D.Kibble and Colby R. Halsey , McGraw Hill medical.	Online
Websites	Website Address.	

Grading Scheme
مخطط الدرجات

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

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

Module Information
معلومات المادة الدراسية

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

		☒ Seminar	
Module Level		**Semester of Delivery**	
Administering Department		**College**	
Module Leader	Zainab AbdulJabbar Ridha Al-Ali	**e-mail**	Zainab-alali@uomisan.edu.iq
Module Leader's Acad. Title	Professor	**Module Leader's Qualification**	Ph. D.
Module Tutor	Non	**e-mail**	E-mail
Peer Reviewer Name	Non	**e-mail**	E-mail
Scientific Committee Approval Date		**Version Number**	

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	**Semester**	
Co-requisites module	N0ne	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	1.To provide students with an understanding of the structure and function of a number of key physiological systems and their role in body homeostasis. 2.To study the physiology of humans as a model for physiological processes in other organisms. 3.To describe a range of tissues and physiological processes in humans at an introductory level. 4.To relate physiological processes to their bases at cellular levels. 5.To be able to understand and analyses experimental work in physiology. 6.To be able to apply problem-solving skills to practical problems in physiology, including the use of mathematics and data analysis. 7.To develop further practical biological skills introduced in this Physiology course.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1.Introductory knowledge of the cellular and biochemical processes which underlyingphysiological processes in humans. 2.Demonstrate an understanding of special mechanisms used to transport selectedmolecules unable to cross the plasma membrane on their own: carrier mediated;endocytosis; exocytosis. 3.Describe the anatomy, physiology and control of a number of key physiologicalsystems critical for the functioning of the human body.

	4.Basic knowledge of communications between cells is largely by extra cellular chemical messengers: paracrine, neurotransmitters and neurohormones. 5.Explain principles and solve problems in human physiology. 6.Introductory-level knowledge of physiology of major processes, such as cardiovascular system, nervous system, digestive system, respiratory system, endocrinology and reproductive system in human . 7.Demonstrate an understanding of levels of organization of key physiological systems from cells to function. 8.Basic knowledge to perform, analyses and report on experiments and observations in physiology 9.Relate knowledge of physiological systems above to selected homeostatic mechanisms and their control. 10.Recognize the principal tissue structures to understanding of key physiological systems.
Indicative Contents المحتويات الإرشادية	Theory Lectures Learning concepts of each theoretical lecture or groups of lectures. Lab. Lectures Learning concepts of each laboratory lecture or groups of lectures.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Lectures: In traditional lecture-based courses, instructors deliver content to students throughspoken presentations. This format is often supplemented with slides, multimedia, or handoutsto aid understanding. •Workshops: Workshops enhance the knowledge and understanding of the subject gainedfrom lectures and develop fundamental and subject-specific skills. •Self-guided learning contributes to subject-specific knowledge and self-motivation. •The examinations demonstrate achievement of the appropriate level of subject-specific knowledge of physiology, with an emphasis on understanding and communication (essay and problem-based questions) or recall of factual knowledge (multiple choice or short answerquestion tests) •Tutorials: Tutorials are small-group sessions led by a tutor, where students can ask questions,receive individualized support, and clarify concepts covered in lectures or readings.

	•Practical analysis based on subject-specific knowledge and demonstrate subject-specificskills in understanding experimental work and data analysis. •Practical exercises allow students to utilize subject-specific knowledge gained from lectures,and support the development of key and subject-specific skills. •Flipped classroom: In a flipped classroom model, students are introduced to course materialthrough self-paced learning activities outside of class (e.g., watching pre-recorded lectures orreading texts), freeing up class time for interactive discussions, problem-solving, and hands-onactivities.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem.) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.3
Unstructured SWL (h/sem.) الحمل الدراسي غير المنتظم للطالب خلال الفصل	71	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.7
Total SWL (h/sem.) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10(10%)	3,10	1,2,3,6,8,9,11
	Assignments	2	10(10%)	5,12	3,10
	Projects / Lab.	1	10(10%)		
	Report	1	10(10%)		7,12
Summative assessment	**Midterm Exam**	1	10(10%)	8	1-8
	Final Exam	1	50(50%)	16	1-14
Total assessment			100(100%)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to cell physiology
Week 2	The general and cellular basis of medical physiology

Week 3	Cardiovascular system: Function, organs and diseases
Week 4	Generation and conduction of the cardiac impulse
Week 5	Physiology of the nervous system I
Week 6	Physiology of the nervous system II
Week 7	Mid. Exam
Week 8	Muscle physiology
Week 9	Renal physiology Week
Week 10	Digestive system I: Structures and tissues
Week 11	Digestive system II : Digestion and absorption
Week 12	The Anatomy and Physiology of the respiratory system
Week 13	Endocrinology I
Week 14	Endocrinology I I
Week 15	Heat regulation
Week 16	Final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	General laboratory rules and safety procedures
Week 2	Introduction to blood physiology.
Week 3	Hemoglobin estimation
Week 4	Packed cell volume (PCV)
Week 5	Total R.B.C. count
Week 6	Total W.B.C. count
Week 7	Differential WBC count
Week 8	Erythrocyte sedimentation rate (ESR)
Week 9	Clotting and bleeding time
Week 10	ABO blood groups
Week 11	Blood pressure.
Week 12	Experiments on respiratory system
Week 13	Insulin regulation of blood glucose
Week 14	Electrocardiogram (ECG).
Week 15	Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Ganong's review of medical physiology (2019).KimE.Barrett,Susan M.Barman, HeddwenL.Brooks and Jason Yuan.,26th edition, McGraw Hill education.	Online

Recommended Texts	Medical physiology (2009) .Jonathan D.Kibble and Colby R. Halsey , McGraw Hill medical.	Online
Websites	Website Address.	

Grading Scheme
مخطط الدرجات

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

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

Module Information
معلومات المادة الدراسية

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

Module Level		**Semester of Delivery**	
Administering Department	Medical physics	**College**	Faculty of Science
Module Leader	AFRAH.ADIL.HAASN	**e-mail**	Afrah.adil@uomisan.edu.iq
Module Leader's Acad. Title	Ass.lec.	**Module Leader's Qualification**	Msc
Module Tutor	Non	**e-mail**	E-mail
Peer Reviewer Name	Non	**e-mail**	E-mail

Scientific Committee Approval Date		Version Number	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	N0ne	**Semester**	
Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية			
Module Aims أهداف المادة الدراسية	B - Course Skill Objectives B1 - Student knowledge of human anatomy B2 - A complete description of the various body systems		
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	A- Cognitive Objectives A1 - To enable students to acquire knowledge and understanding of the basics of physiology. A2 - To enable students to acquire knowledge and understanding of the practical applications of physiology. A3 - To enable students to acquire knowledge and understanding of the applications of anatomy in the professional field. A4 - To enable students to acquire knowledge and understanding of the applications of physiology through modern software applications. B - Course Skill Objectives B1 - Student knowledge of human anatomy B2 - A complete description of the various body systems		
Indicative Contents المحتويات الإرشادية	Theory Lectures Learning concepts of each theoretical lecture or groups of lectures. Lab. Lectures Learning concepts of each laboratory lecture or groups of lectures.		
Learning and Teaching Strategies استراتيجيات التعلم والتعليم			

Strategies	Lectures: In traditional lecture-based courses, instructors deliver content to students throughspoken presentations. This format is often supplemented with slides, multimedia, or handoutsto aid understanding. •Workshops: Workshops enhance the knowledge and understanding of the subject gainedfrom lectures and develop fundamental and subject-specific skills. •Self-guided learning contributes to subject-specific knowledge and self-motivation. •The examinations demonstrate achievement of the appropriate level of subject-specific knowledge of physiology, with an emphasis on understanding and communication (essay and problem-based questions) or recall of factual knowledge (multiple choice or short answerquestion tests) •Tutorials: Tutorials are small-group sessions led by a tutor, where students can ask questions,receive individualized support, and clarify concepts covered in lectures or readings. •Practical analysis based on subject-specific knowledge and demonstrate subject-specificskills in understanding experimental work and data analysis. •Practical exercises allow students to utilize subject-specific knowledge gained from lectures,and support the development of key and subject-specific skills. •Flipped classroom: In a flipped classroom model, students are introduced to course materialthrough self-paced learning activities outside of class (e.g., watching pre-recorded lectures orreading texts), freeing up class time for interactive discussions, problem-solving, and hands-onactivities.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا	
Total SWL (h/sem.) الحمل الدراسي الكلي للطالب خلال الفصل	60

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10(10%)	3,10	1,2,3,6,8,9,11
	Assignments	2	10(10%)	5,12	3,10
	Projects / Lab.	1	10(10%)		
	Report	1	10(10%)		7,12
Summative assessment	Midterm Exam	1	10(10%)	8	1-8
	Final Exam	1	50(50%)	16	1-14
Total assessment			100(100%)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to Human Anatomy
Week 2	Skeletal system
Week 3	INTEGUMENTARY SYSTEM
Week 4	NERVOUS SYSTEM
Week 5	Endocrine system
Week 6	The male Reproductive System
Week 7	skeletal system
Week 8	The Gastrointestinal Tract
Week 9	Integumentary System
Week 10	The Lymphatic System
Week 11	Anatomy of Digestive System
Week 12	The Cardiovascular System
Week 13	Anatomy of Urinary System
Week 14	Anatomy of Respiratory System
Week 15	Classification & Structure of Blood Vessels
Week 16	Final Exam

Delivery Plan (Weekly Lab. Syllabus)
المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Introduction to Human Anatomy
Week 2	Skeletal system

Week 3	**INTEGUMENTARY SYSTEM**
Week 4	**NERVOUS SYSTEM**
Week 5	**Endocrine system**
Week 6	**The male Reproductive System**
Week 7	**skeletal system**
Week 8	**The Gastrointestinal Tract**
Week 9	**Integumentary System**
Week 10	**The Lymphatic System**
Week 11	**Anatomy of Digestive System**
Week 12	**The Cardiovascular System**
Week 13	**Anatomy of Urinary System**
Week 14	**Anatomy of Respiratory System**
Week 15	**Classification & Structure of Blood Vessels**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Gilroy, Anne M. "Anatomy: an essential textbook.	Online
Recommended Texts	Drake, Richard Lee, et al. Gray's anatomy for students. Elsevier Health) Sciences TW, 30	Online
Websites	Website Address.	

Grading Scheme
مخطط الدرجات

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

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

Module Information
معلومات المادة الدراسية

Module Title	**Medical physic**	**Module Delivery**

Module Type	**B**	☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code			
ECTS Credits	**5**		
SWL (hr/sem)	**125**		

Module Level	1	**Semester of Delivery**	1 semester 2022-2023
Administering Department	Type Dept. Code	**College**	Type College Code
Module Leader	**Dr. Dalya Khaled Naser**	**e-mail**	ahmedkhalafzager@uomisn.edu.iq
Module Leader's Acad. Title	Assist. Prof .Dr	**Module Leader's Qualification**	Ph.D.
Module Tutor	Name (if available)	**e-mail**	E-mail
Peer Reviewer Name	Name	**e-mail**	E-mail
Scientific Committee Approval Date	01/06/2023	**Version Number**	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

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

Module Aims أهداف المادة الدراسية	1. The goal of the course is to understand the importance of medical physics in prevention, diagnosis, and treatment. Additionally, it aims to teach the physics of various medical devices used in the field.

Module Learning Outcomes مخرجات التعلم للمادة الدراسية	2. Know the importance of medical physics in diagnosis and treatment. 3. Learn about treatment by understanding the physics of the devices used. 4. Learn about medical physics diagnostic methods. 5. Understand how to protect patients and workers from the risks of using various devices in diagnosis and treatment. 6. Understand radiation units and assess dangers due to radiation exposure and study some medical applications of radiation.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 7. Define the requirement : Computer hardware and program define hardware and software algorithm ,flowchart to design the program 8. Development: implementation the software using computer to solve problems by writing code source. 9. Testing : test the software and program to integrate the woke study 10. Maintenance : to enhancement education and fix error 11. Evaluation education to disposal

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	Class lectures (theory) boratory practical lectures

Student Workload (SWL)
الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	90	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	35	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation
تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction of medical physics
Week 2,3	Light in medicine (introduction ,properties of light, measurement of light and its units, application of visible light in medicine, application of microscope in medicine, application of infrared in medicine, application of ultraviolet and infrared in medicine
Week 4	Laser in medicine (introduction , properties of laser, Production of Laser, Types of Lasers, Laser in Medicine)
Week 5	X-rays (The Properties of X-rays, X – Ray Production, mechanisms produce of X-rays, Interaction of X-Ray with Matter, Attenuation of X-ray, Biological Effects of X-Ray)
Week 6	Exam
Week 7,8	Sound in medicine (introduction, General Properties of Sound, Effect the nature of sound on human hearing, Sound in Medicine, Acoustic Impedance (Z), Reflectivity of Ultrasound Waves, Scattering of Ultrasound Waves, Attenuation of Ultrasound Waves, Application of audible sound in medicine, Uses of Ultrasound in Medicine, Why Use Ultrasound, Sonar, Generating Ultrasound, Ultrasound transducer,

	Ultrasound Transducer Types, Modes of Ultrasound Scan, Physiological effects of ultrasound in therapy)
Week 9, 10	Physics of eyes and vision (Introduction, Focusing elements of the eye, Some other elements of the eye, The retina-the light detector of the eye, The sensation of the vision, Didffraction effects on the eye, Visual acuity and resolution of the eyes, Optical illusions and related phenomena, Defective vision and its correction, Color vision and chromatic aberration, Instruments used in ophthalmology)
Week 11	Physics of the ear and hearing (Introduction, The outer ear, The middle ear, The inner ear, Sensitivity of the ear, Hearing tests, deafness and hearing aids)
Week 12,13	Nuclear Physics and Radioactivity (Define ionizing nuclear radiation, their benefit, harmfulness in human life)
Week 14	Nuclear energy, effect of use radiation (Understand the meaning of ionizing, know radiation units and asses radiation damage)
Week 15	Exam
Week 1	Introduction of medical physics
Week 2,3	Light in medicine (introduction ,properties of light, measurement of light and its units, application of visible light in medicine, application of microscope in medicine, application of infrared in medicine, application of ultraviolet and infrared in medicine
Week 4	Laser in medicine (introduction , properties of laser, Production of Laser, Types of Lasers, Laser in Medicine)
Week 5	X-rays (The Properties of X-rays, X – Ray Production, mechanisms produce of X-rays, Interaction of X-Ray with Matter, Attenuation of X-ray, Biological Effects of X-Ray)
Week 6	Exam

Week 7,8	Sound in medicine (introduction, General Properties of Sound, Effect the nature of sound on human hearing, Sound in Medicine, Acoustic Impedance (Z), Reflectivity of Ultrasound Waves, Scattering of Ultrasound Waves, Attenuation of Ultrasound Waves, Application of audible sound in medicine, Uses of Ultrasound in Medicine, Why Use Ultrasound, Sonar, Generating Ultrasound, Ultrasound transducer, Ultrasound Transducer Types, Modes of Ultrasound Scan, Physiological effects of ultrasound in therapy)
Week 9, 10	Physics of eyes and vision (Introduction, Focusing elements of the eye, Some other elements of the eye, The retina-the light detector of the eye, The sensation of the vision, Didffraction effects on the eye, Visual acuity and resolution of the eyes, Optical illusions and related phenomena, Defective vision and its correction, Color vision and chromatic aberration, Instruments used in ophthalmology)
Week 11	Physics of the ear and hearing (Introduction, The outer ear, The middle ear, The inner ear, Sensitivity of the ear, Hearing tests, deafness and hearing aids)
Week 12,13	Nuclear Physics and Radioactivity (Define ionizing nuclear radiation, their benefit, harmfulness in human life)
Week 14	Nuclear energy, effect of use radiation (Understand the meaning of ionizing, know radiation units and asses radiation damage)
Week 15	Exam
Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	**Introduction to Laboratory Safety & Radiation Protection**
Week 2	**Measurement of Vital Signs (Blood Pressure, Pulse, Temperature)**
Week 3	**Principles of Ultrasound and Basic Scanning**
Week 4	**Electrocardiography (ECG): Recording and Interpretation**

Week 5	**Respiratory Measurements (Spirometry)**
Week 6	**Biopotential Electrodes and Amplifiers**
Week 7	**Radiation Detection: Geiger-Müller Counter**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	None	Yes
Recommended Texts	Medical and Clinical Physics **commended Resources** Iedical Journals and Medical Physics Journals	No
Websites	lectronic references: All references related to medical physics	

Grading Scheme
مخطط الدرجات

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

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

Module Information
معلومات المادة الدراسية

Module Title	**Plasma Physics**	**Module Delivery**

Module Type	**B**	☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**SCI1101**		
ECTS Credits	**5**		
SWL (hr/sem)	**125**		

Module Level	1	**Semester of Delivery**	1 semester 2022-2023
Administering Department	Type Dept. Code	**College**	Type College Code
Module Leader	Ahmed shhab ahmed	**e-mail**	Ahmedshihab@uomisan.edu.iq
Module Leader's Acad. Title	Assist. Prof .Dr	**Module Leader's Qualification**	Ph.D.
Module Tutor	Name (if available)	**e-mail**	E-mail
Peer Reviewer Name	Name	**e-mail**	E-mail
Scientific Committee Approval Date	01/06/2023	**Version Number**	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

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

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	The objective of this course is to introduce students to the fundamental principles and applications of plasma physics. Students will gain a solid understanding of plasma behavior in both natural and laboratory environments, including the theoretical foundations of plasma dynamics, waves, and interactions with electromagnetic fields. The course also covers practical applications such as plasma

	generation, diagnostics, fusion energy, and industrial and medical uses.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Define and describe the fundamental properties of plasma and distinguish it from other states of matter. Apply fluid and kinetic models to analyze the behavior of plasma under various physical conditions. Analyze the motion of charged particles in electric and magnetic fields using classical and mathematical models. Understand wave propagation in plasmas, including electrostatic and electromagnetic wave phenomena. Evaluate plasma parameters such as Debye length, plasma frequency, and temperature using theoretical and experimental methods. Explain the principles of plasma generation using various discharge methods (DC, RF, microwave, etc.).
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Introduction to Plasma Physics** • Definition and characteristics of plasma • Natural and laboratory plasmas • Plasma applications in science and industry • **Basic Plasma Parameters** • Debye shielding • Plasma frequency • Quasi-neutrality and criteria for plasma behavior • • Single Particle Motion • Motion of charged particles in electric and magnetic fields

	• Cyclotron motion, drifts, and magnetic mirrors
	
	• **Plasma Fluid Theory**
	
	  • Plasma as a conducting fluid
	  • Magnetohydrodynamics (MHD)
	  • Continuity, momentum, and energy equations
	  • • Plasma Kinetics
	  • Distribution functions and the Boltzmann equation
	  • Vlasov equation and collisionless plasmas
	
	• **Waves in Plasmas**
	
	  • Electrostatic and electromagnetic waves
	  • Langmuir waves, ion-acoustic waves
	  • Wave propagation in magnetized plasmas
	
	• **Collisions and Transport**
	
	  • Collision frequency and cross-sections
	  • Resistivity, diffusion, and thermal conduction in plasmas
	
	• **Plasma Generation and Sources**
	
	  • Gas discharges (DC, RF, microwave)
	  • Plasma ignition and maintenance

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	

Strategies	• **Lectures**
	
	  • Core theoretical concepts will be delivered through interactive lectures.
	  • Multimedia presentations and real-world examples will enhance understanding.

	• **Problem-Solving Tutorials**
	  • Weekly or bi-weekly sessions focusing on applying concepts to numerical and conceptual problems.
	  • Encourages critical thinking and independent learning.
	• **Laboratory Experiments**
	  • Hands-on experiments to reinforce theoretical principles.
	  • Students will learn how to generate, measure, and analyze plasma using real diagnostic tools.
	• **Group Discussions and Presentations**
	  • Small group activities to encourage collaborative learning and peer teaching.
	  • Presentations on selected plasma applications or recent research findings.
	• **Simulations and Visualizations**
	  • Use of simulation software (e.g., MATLAB, COMSOL) to visualize plasma behavior.
	  • Interactive tools to demonstrate wave propagation, particle motion, and field effects.
	• **Supplementary Readings and Case Studies**
	  • Directed readings from key plasma physics textbooks and journal articles.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	21	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to Plasma Physics, Definition, characteristics of plasma, examples in nature and technology.
Week 2	Particle Motion in Electromagnetic Fields
Week 3	Plasma as a Fluid
Week 4	Plasma Kinetics and Distribution Functions
Week 5	Debye Shielding and Plasma Parameters
6	Waves in Plasmas I – Electrostatic Waves
7	Waves in Plasmas II – Electromagnetic Waves
8	Collisions and Transport Processes
9	Plasma Diagnostics
10	Plasma Confinement and Stability
11	Plasma Sources and Generation Methods
12	Fusion Plasmas and Applications
13	Industrial and Medical Applications of Plasma

14	Review & Final Assessment

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Lab 1	Overview of plasma states, applications, and safety procedures.
Lab 2	Plasma Generation Techniques
Lab 3	Paschen's Law Experiment
Lab 4	Electrical Characteristics of Plasma
Lab 5	Langmuir Probe Diagnostics
Lab 6	Spectroscopic Analysis of Plasma Emission
Lab 7	Magnetic Confinement of Plasma

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	None	Yes
Recommended Texts	• **Chen, F. F.** – *Introduction to Plasma Physics and Controlled Fusion* (Vol. 1: Plasma Physics) • **Nicholas A. Krall & Alvin W. Trivelpiece** – *Principles of Plasma Physics* • **Donald A. Gurnett & Amitava Bhattacharjee** – *Introduction to Plasma Physics: With Space and Laboratory Applications*	No
Websites	• Selected journal articles from *Physics of Plasmas*, *Journal of Plasma Physics*, and *Nuclear Fusion* • Lecture notes, slides, and concept summaries provided via the learning management system (e.g., Moodle, Blackboard) • Video lectures and tutorials (e.g., from MIT OpenCourseWare, Coursera, or YouTube)	

Grading Scheme

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

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

1. Course Name : numerical analysis
2. Course Code Department of Physical Sciences - third Stage general physics
3. Semester / Year

Semester(2024–2025)

4. Description Preparation Date:.

10/1/2025

5. Available Attendance Forms

Actual Attendance

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

30 hours, 2 hours per week * 15 weeks /

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

Name: bahalden Abdul Kathim

8. Course Objectives

Course Objectives	- It makes the student familiar and aware of the most important characteristics of the course. - Enabling the student to understand the concept of generalized coordinates - Enabling the student to understand complex numbers and represent them - Enabling the student to understand complex functions, their derivation and integration - Enabling the student to understand the concept of publishing functions using immediate strings

9. Teaching and Learning Strategies

Strategy	- Use of technology in learning (display screen and computers)

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	(٤ **Th)**	Main computer components Flowchart and algorithm	Write a code in the numerical analysis lab	**Deliverance - discussion**	**General questions and discussion**
2	(٤**Th)**	Solution of equation with o variable Fixed point Iteration Method	Write a code in the numerical analysis lab	**Deliverance - discussion**	**General questions and discussion**
3	(٤ **Th)**	Newton-Raphsc Iteration Metho Bisection Metho	Write a code in the numerical analysis lab	**Deliverance - discussion**	**General questions and discussion**

4	**(٤ Th)**	Numerical Integration Trapezeidol Method	Write a code in the numerical analysis lab	**Deliverance - discussion**	**General questions and discussion**
5	**(٤Th)**	Numerical Method for first order differential equations Eule Method	Write a code in the numerical analysis lab	**Deliverance - discussion**	**General questions and discussion**
6	**(٤ Th)**	Euler Method,	Write a code in the numerical analysis lab	**Deliverance - discussion**	**General questions and discussion**
7	**(٤Th)**	formative exam			**exam**
8	**(4 Th)**	Numerical Differentional	Write a code in the numerical analysis lab		**General questions and discussion**
9	**(4 Th)**	Curve fitting an approximation, Least-Squar approximation	Write a code in the numerical analysis lab	**Deliverance - discussion**	General questions and discussion
10	**(4 Th)**	Newton-Raphsc Iteration Metho Bisection Metho	Write a code in the numerical analysis lab	**Deliverance - discussion**	General questions and discussion
11	**(4 Th)**	Numerical Method for first order differentional equations Eule Method	Write a code in the numerical analysis lab	**Deliverance - discussion**	General questions and discussion

12	(4 **Th)**	Numerical Method for first order differentional equations Euler Method	Write a code in the numerical analysis lab	**Deliverance - discussion**	General questions and discussion
13	(4**Th)**	Improved Euler Method,	Write a code in the numerical analysis lab	**Deliverance - discussion**	General questions and discussion
14	(4 **Th)**	Rang Kutta Method	Write a code in the numerical analysis lab	**Deliverance - discussion**	General questions and discussion
15	(4**h)**	**Summative exam**			
16	(				

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

Course	Daily preparation, daily and oral exams	Daily assignments	Exam	Final -
1st	2	3	15	20

12. Learning and Teaching Resources

Required textbooks (curricular books, if ar	
Main references (sources)	Numerical Analysis for Engineers Methods and Applications, Second Edition By Bilal Ayyub, Richard H. McCuen
Recommended books and references (scientific journals, reports…)	**Numerical Analysis Hardcover – Illustrated, 21 Dec. 2017** by Timothy Sauer (Author)
Electronic References, Websites	

Level four

Module Information معلومات المادة الدراسية					
Module Title	**nuclear physics**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**PHY32023**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	UGIV		**Semester of Delivery**	7	
Administering Department	Bachelor's degree in Physics (First cycle)		**College**	College of science	
Module Leader	Dr. Zahra abd AL- hussian		**e-mail**		
Module Leader's Acad. Title	Ass. Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date			**Version Number**	1.0	

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

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

أهداف المادة الدراسية	On completion of the module the student is expected to be able to: LO1 Understand atomic physics terminology, nuclear particles and interaction processes with material. LO2 Identify and discuss the purpose of key components of nuclear power plant for a variety of different configurations. LO3 Understand the basic nuclear principles underlying power reactor technology and be able to carry out basic calculations in relation to the design and operation of the plant. LO4 Have a critical understanding of nuclear plant health, safety and environmental issues..
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Basic properties of the Nucleus,Definitions andNuclear Terminology Commonly Used Units in Nuclear Physics, properties of Nucleus Radius and Density of the Nucleus, Charge of Nucleus Mass of Nucleus solved Examples Binding Energy, Other Formulas of Binding Energy Stability of the Nucleus, Nuclear Force Nuclear Models,solved Examples Introduction, Radioactivity Decay Law Successive Nuclear Decay first exam Radioactive Equilibrium, Natural Radiation Series, Units of Radiation CarbonDating solved Examples Nuclear Radiation, Alpha Decay Geiger – Nutal Law ,Alpha Particles Spectrum Theory of Alpha – Decay, Selection Rules of Alpha – Decay Second exam Hypothesis Selection Rules of Beta Decay, Gamma Decay Selection Rules of Gamma Decay,Solved Examples Introduction, Factors affecting nuclear reactions, Particle Incident Energy, Particle Incident Type Reaction Mechanism, Direct Reaction Compound Nuclear Reaction, Conservation Laws Energy Conservation Law Momentum Conservation Law ,Reaction Energy, Threshold Energy, Solved Examples Introduction,Theory of Nuclear Fission,Type of Nuclear Fission Midterm exam Characteristics of Nuclear Fission, Energy distribution of Fission Fragments,Basic Fusion Processes Requirements for control,Suggested Fusion Devices,Thermo Nuclear Weapons,Solved Examples Fundamental particle ,Characteristic of the elementary particles,Leptons Grope , Mesons Grope and Baryons Grope,Proton and antiproton,Neutron and antineutron,Neutrino and anti-neutrino,Pimesons,Mesons theory of Nuclear Force,Basic Interaction Strange Particles,Conservation Laws,Solved Examples
Indicative Contents المحتويات الإرشادية	To understand the basic nuclear principles underlying power reactor technology and be able to carry out basic calculations in relation to the design and operation of the plant C1 The ability to understand the mechanisms of neutron diffusion and moderation. C2 The ability to understand and solve simple problems in homogeneous reactor theory. C3 The ability to understand and apply simple models for the operation and

	shut down of reactors. C4 The ability to understand and calculate the thermal aspects of core heat generation and cooling. To have a critical understanding of nuclear plant health, safety, and environmental issues C1 The ability to describe the general impact of radiation on health, the background environmental radiation levels, health effects of radiation exposure and the relationship between reactor fission products and potential health impacts. C2 The ability to identify the failure modes associated with historical nuclear accidents, the health and environmental impacts of those accidents, and lessons learned for application in future. C3 The ability to describe the nuclear waste disposal process and current issues.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted is to present this unit in theoretical lectures from the professor of the scientific subject, while encouraging students to participate in clarifying the topics through discussion among students with the use of means of clarification, including posters in addition to scientific films, with a description of recent reports of scientists in this field

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	71	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5

Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150

Module Evaluation
تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	1. Overview, historical introduction, history and significance of Nuclear and Particle Physics
Week 2	2. Methods of Nuclear Physics, scattering and spectroscopy, nuclear radius, composition of matter, mass and charge distribution in the nucleus, the discovery of the proton and neutron
Week 3	3. Nuclear models, the mass of the atomic nuclei, droplet model, bonding energy, nuclear shell model
Week 4	4. Structure of cores, angular momentum, spin, parity, mag. and electr. moments, collective excitation forms, spin-orbit interaction

Week 5	5. Radioactivity and spectroscopy, radioactive decay, natural and civilisational sources of ionising radiation
Week 6	6. Nuclear energy, nuclear fission, nuclear reactors,
Week 7	7. nuclear fusion, star power, star development, formation of the chemical elements of hydrogen duction
Week 8	8. Instruments, accelerators and detectors
Week 9	exam
Week 10	9. Electromagnetic interaction, differential cross section, virtual photons, Feynman graphs, exchange interaction
Week 11	10. Strong interaction, quarks, gluons, colour and degree of freedom, deep-inelastic electron-proton scattering, confinement, asymptotic freedom, particle zoo, isospin, strangeness, SU (3) symmetry, antiprotons
Week 12	exchange particles, W and Z, neutrinos, neutrino vibrations
Week 13	12. Standard model, three families of leptons and quarks, quark-lepton symmetry, Higgs boson, free parameters
Week 14	(iii) Fuel resources and fuel processing (iv) Waste and storage
Week 15	(i) Radiation and health (ii) Plant safety and accidents
Week 16	Radiation protection and shielding Part 2 Nuclear Reactor Engineering , Neutron diffusion and moderation (ii) Reactor core theory

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

Week 6	Lab 6:
Week 7	Lab 7:

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts		No
Recommended Texts		No
Websites		

Grading Scheme
مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
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Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

Module Information
معلومات المادة الدراسية

Module Title	**Electromagnetics**	**Module Delivery**	
Module Type	**Core**		☒ Theory
Module Code	**EPE208**		☒ Lecture
ECTS Credits	**7**		☐ Lab
SWL (hr/sem)	**175**		☒ Tutorial ☒ Practical ☐ Seminar

Module Level	1	**Semester of Delivery**	1
Administering Department	Type Dept. Code	**College**	Type College Code
Module Leader	name: Ahmed Hashim	**e-mail**	email:
Module Leader's Acad. Title	Asst. Lect.	**Module Leader's Qualification**	M.Sc.
Module Tutor	Name (if available)	**e-mail**	E-mail
Peer Reviewer Name	Name	**e-mail**	E-mail
Scientific Committee Approval Date		**Version Number**	

Relation with other Modules
العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	**Semester**	

Co-requisites module	None	**Semester**	

Module Learning Outcomes مخرجات التعلم للمادة الدراسية	**On completion of the course the students should be able:** • To have detailed knowledge of the physical background and terminology of the electromagnetic field theory for electrical engineering problems • To understand the electromagnetic field behaviour. • To select and use appropriate theoretical models for analysis, problem solving and finding solutions related to the electrostatic, electrodynamics and electromagnetic fields.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Part A - Basic Concepts** Introduction, Systems of Units, Charge and Current, Voltage, Power and Energy, Circuit Elements [18 hrs] **Part B - Basic Laws** Ohm's Law, Nodes, Branches, and Loops, Kirchhoff's Laws, Series Resistors and Voltage Division, Parallel Resistors and Current Division, Wye-Delta Transformations. [15 hrs] **Part C - Methods of Analysis** Nodal Analysis, Nodal Analysis with Voltage Sources, Mesh Analysis, Mesh Analysis with Current Sources [12 hrs] **Part D - Circuit Theorems** Superposition, Source Transformation, Thevenin's Theorem, Norton's Theorem, Maximum Power Transfer [24 hrs] Revision problem classes [6 hrs]

Learning and Teaching Strategies

	how to extract these concepts mathematically.

استراتيجيات التعلم و التعليم	
Strategies	**1. Behavior management** Behavior management strategies foster an atmosphere of mutual respect, reduce disruptive behavior and ensure students have an equal opportunity to fulfill their potential in the classroom. It's crucial to provide them with both a positive and productive learning environment. Examples include establishing a reward system with an interactive chart where students move up or down depending on their performance and behavior in class. **2. Blended learning** With a blended learning teaching strategy, technology is incorporated with traditional learning. This allows students to work at their own pace, research their ideas and become more physically engaged during lessons. Examples include providing interactive tablets or whiteboards with engaging activities and posting classwork online for easier access. **3. Cooperative learning** Group work is a cooperative learning strategy that allows students with various learning levels to work together. By encouraging them to express their own ideas and listen to others' ideas as a group, you help students develop communication and critical thinking skills. Examples include solving math puzzles together, performing skits as a team or working on group presentations. **4. Formative assessment** A formative assessment is used periodically to monitor student learning incrementally. This can more effectively measure the process of learning as opposed to end-of-unit tests and can help you to improve your teaching methods throughout the year. Examples of this teaching strategy include self-evaluation exercises and summarizing a topic in multiple ways. **5. Student-led teaching** The student-led teaching strategy lets students become the teacher. In a classroom with learners at different levels, you can better engage those learning faster by showing them how to teach and give feedback to their peers.They may team-teach or work in groups to teach a new topic. Examples include letting a student teach an entire lesson or having advanced writers lead a peer-editing session as well as provide constructive criticism.

Student Workload (SWL)

	Material Covered
Week 1	**Electromagnetics Overview** *What is electromagnetics?; Why study electromagnetics?; Course topics*
Week 2	**Vector Algebra:** *Scalars and Vectors; Unit Vector; Vector Addition and Subtraction; Position and Distance Vectors; Vector Multiplication; Components of a Vector*
Week 3	**Coordinate Systems and Transformation:** *Cartesian Coordinates (x, y, z); Circular Cylindrical Coordinates (ρ, φ, z); Spherical Coordinates (r, Φ, φ); Constant-Coordinate Surfaces, the transformation between coordinate system.* **Vector Calculus:** *Differential Length, Area, and Volume; Line, Surface, and Volume Integrals Del Operator; Gradient of a Scalar; Divergence of a Vector and Divergence Theorem.*
Week 4	**Coulomb's Law and Electric Field Intensity:** *The experimental law of Coulomb, Electric field intensity; Field of n point charges; Electric fields due to continuous charge distributions (line charge, surface charge and volume charge distributions), Steam line and sketches of fields; Electric flux density.*
Week 5	**Gauss's Law-Electric Flux Density:** *Gauss's law; Some symmetrical charge distribution, Application of gauss's law; Maxwell's first equation (for electrostatics); The vector operator and the divergence theorem.*
Week 6	**Electrostatic Fields** *Coulomb's Law and Field Intensity; Electric Flux Density, and Gauss's Law; Applications of Gauss's Law; Energy and Potential.*
Week 7	**Energy and Potential:**

	Energy and potential-energy expended in moving a point charge in an electric field: The line integrals; Potential difference and potential. The potential field of a point charge; The potential field of a system of charges; Conservative property; Potential gradient; The dipole energy density in the electrostatic field.
Week 8	**Mid-term Exam**
Week 9	**Electric Fields in Material Space:** *Properties of Materials; Convection and Conduction Currents; Conductor properties and boundary conditions; The method of mages; Semiconductors; The nature of dielectric materials; Boundary conditions for perfect dielectric materials.*
Week 10	**Capacitance:** *Capacitance; Capacitance of some useful configuration; Capacitance of a two-wire line; Poisson's and Laplace's equations-Poisson's and Laplace equations; Uniqueness theorem; Solution of Laplace's equation in certain situation; Solution of Poisson's equation in certain situation; Product solution of Laplace's equation.*
Week 11	**Magnetostatic Fields:** *The steady of magnetic field; Biot- savart law; the curl; Stocke's theorem*
Week 12	**Magnetostatic Fields:** *Ampere's circuit law; Application of ampere's law; Magnetic flux and magnetic flux density; The scalar and vector magnetic potential; Derivation of steady magnetic field laws.*
Week 13	**Magnetostatic Fields:** *Magnetic forces; Materials and inductance-force on a moving charge; Force on a differential current element; Force between differential current elements.*
Week 14	**Magnetostatic Fields:** *Force and torque on a closed circuit; The nature of magnetic materials; Magnetization and permeability; Magnetic boundary conditions; The magnetic circuit; Potential energy and forces on magnetic materials; Inductance and mutual inductance; Time varying fields.*

Week 15	**Maxwell's Equations:** *Maxwell's equations-faraday's law; displacement current; Maxwell's equations in point form; Maxwell's equations integral form; the retarded potentials.*
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	• Matthew, N. O. "**Sadiku Elements of Electromagnetics.**" (2018). • Electromagnetics By Joseph Edminister (Schaum's Outline Series) Joseph Edminister, Vishnu Priye Mc Graw Hill Education	Yes
Recommended Texts	• Hayt, William Hart. **Engineering Electromagnetics**. McGraw-Hill Companies, Sixth Edition, 2001.	No
Websites	https://www.coursera.org/browse/physical-science-and-engineering/electrical-engineering	

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

Course Information

Course title: Quantum Mechanics
Course type: Core
Course credits: 3
Time: Mon. 10:30 AM – 1:30 PM; Location: (Classroom #1)
Course teacher: Dr. Dheyaa B. Habash
E-mail: dheyaa.alameri@uomisan.edu.iq
Office hours: Mon. or Tue. 8:30 - 10:30 am, and by appointments

Prerequisites

Quantum Mechanics I, II.

Course Description

This three-credit course is designed for understanding the basics of quantum physics that targeted some of the science majors, such as physics, chemistry, and mathematics. The course will generally comprehend a variety of topics, including occupation numbers. Eigen values, states, functions, operators, and approximation methods.

Course aims

1. Introducing the postulates of quantum mechanics for physical systems.
2. Introducing the concepts of quantum mechanics in simple microscopic systems.
3. Introducing the connection between the concepts of quantum mechanics and actual observers.
4. Introducing the role of quantum mechanics in understanding some phenomena in nature.

Course Objectives

- Understanding the concepts of finding the quantities and specific equations in quantum mechanics.
- Ability to employ quantum concepts in solving quantum physics problems.
- Identifying the appropriate concepts to analyze and solve problems in mathematical physics.
- Specific concepts will help students to demonstrate and apply critical thinking towards some applications of quantum and many other courses in physics, including the undergraduate or graduate levels.

Textbook

The official textbook for this course is:

- Introduction to Quantum Mechanics, D. J. Griffiths, 2nd edition. (**Required**)
- Quantum Mechanics: Concepts and Applications. 2nd Ed. 2009, by Nouredine Zettili. (**Recommended**)
- https://www.coursera.org/learn/quantum-mechanics (**Website**)

Learning and Teaching Strategies

The strategy that will be adopted in delivering this course is lectures for the delivery of theory and explanation of methods, illustrated with examples, and for giving general feedback on marked work. This method is appropriate to allow students to develop a wide range of skills, from understanding basic concepts and facts to higher-level thinking. In addition, solving problems in the class will be used to help develop the students' abilities at applying the theory to solving problems. Through the semester, assignments will be given to students to allow them to develop their problem-solving techniques, practice the methods learnt in the module, assess their progress, and to receive feedback. On the other hand, examinations will enable students to reliably demonstrate their own knowledge, understanding, and application of learning outcomes.

Course Outline

1. Occupation number representation for the harmonic oscillator
    - Raising and lowering operators
    - Eigenvalues and eigenstates.
    - Action of raising and lowering operators.
    - Uncertainty principle.
    - Representing eigenstates as eigenfunctions.
    - Representing eigenstates in terms matrices.
2. Angular momentum operators
    - Angular momentum operators
    - Raising and lowering operators of angular momentum
    - Eigenvalues and eigenfunctions of the angular momentum
    - Normalization of the angular momentum operator
    - Matrices
    - The spin
3. Approximation Method: Time independent perturbation theory
    - Non-degenerate systems
    - Degenerate systems
    - Stark effect
    - The fine structure of the Hydrogen
    - The Zeeman effects
    - Hyper fine splitting

Grade Assessment

Grades will be assigned based on:

- Quizzes W/O announcements (12.5 %)
- Homework assignments (15%)
- One or two exam(s) if applicable (67.5 %)
- Attendance (5%)

The first four points result in the annual quest which is weight (40 %) of the total grade.

- Final Exam (100%). The final exam will be ratioed to (60 %) of the total grade.

Grade Scheme

A – Excellent	امتياز	90 - 100
B – Very Good	جيد جدا	80 - 89
C – Good	جيد	70 - 79
D – Moderate	متوسط	60 - 69
E – Satisfactory	مقبول	50 - 59
F – Fail	راسب	0 - 49

Policies and procedures

Attendance: Attendance is mandatory.

Cell phones: please turn off or silence your electronic devices during the class.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**solid state physics I**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**PHY1102**				
ECTS Credits	٦				
SWL (hr/sem)	**150**				
Module Level	UGIV		**Semester of Delivery**	7	
Administering Department	Bachelor's degree in Physics (First cycle)		**College**	College of science	
Module Leader	Dr. Mundher Al-Shakban		**e-mail**	Mundher.al-shakban@uomisan.edu.iq	
Module Leader's Acad. Title	Ass. Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	

Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. Explain mechanical properties of solid matter, and connect these to bond type. 2. Explain how diffraction of electromagnetic waves on solid matter can be used to obtain lattice structure. 3. Know the concept of `phonons¿, and how the dispersion relationship appears for different lattice structures. 4. Explain how a lattice vibrates at finite temperature, and how these vibrations determine the heat capacity and conduction. 5. Know the concept `density of states¿ in one, two and three dimensions. 6. Explain simple theories for conduction of heat and electrical current in metals.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	After the course, the student should be able to • describe and classify materials from their crystal structure and atomic arrangements • apply the theory for X-ray diffraction in reciprocal space (k-space) to determine the lattice structure of crystalline materials and also be able to use these principles for other waves in solid materials • describe the different physical mechanisms for crystal binding by identifying repelling and attractive interaction coupled to atomic properties

	• formulate basic models for lattice vibrations (phonons) and their influence on the physics of crystalline materials, make calculations based on these models and be able to relate the conclusions form the models to experimentally measured properties of materials • formulate electron properties in a periodic potential, explain factors that affects the band structure of a crystalline material, make a simple band structure calculation and based on this develop a qualitative understanding of the band structure of materials • explain the physical principles for different types of electric and magnetic phenomena in solid materials and relate this to macroscopically measurable quantities
Indicative Contents المحتويات الإرشادية	The course introduces k-space (wave vector space) and the reciprocal lattice with its applications, which are central concepts for further studies within solid state physics. In addition, the course gives an overview of different models to describe the properties of solid materials. The syllabus is as follows 9. Classification of solid material, atomic binding 10. Crystalline materials, lattice vectors, unit cells 11. Reciprocal space, Brillouin zones 12. X-ray diffraction, Bragg's law, von Laue equations 13. Lattice vibrations, phonons, heat capacity 14. Free electron model, resistance in metals, Hall effect

	15. Band structure, Bloch wave functions, introduction to band structure calculations 16. Semiconductors, metals, superconductivity and magnetism

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	71	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7

assessment	**Projects / Lab.**	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	1- Crystal structure- 1-1 Basis, Lattice crystal translation vector and lattice-symmetry operations 1-2 two dimensional lattice type-three dimensional lattice type
Week 2	1-3 Miller indices, the indices of a direction, Position in the cell
Week 3	1-4 simple crystal structure (Sodium chloride structure, Cesium chloride structure 1-5 Close-packed structure-Diamond structure, Zinc Sulfide structure).
Week 4	2- Crystal diffraction and the reciprocal lattice 2-1 Bragg law-Experimental diffraction methods
Week 5	2-2 Laue method-rotating crystal method-powder method 2-3 reciprocal lattice-Brilloun zones 2-4 structure factor of the basis.
Week 6	3- Crystal Binding-crystal of Inert gases 3-1 Vander Waals

	3-2 London interaction 3-3 equilibrium lattice constants 3-4 Cohesive energy
Week 7	**Mid-term Exam**
Week 8	3-4 Repulsive interaction 3-5 Compressibility and Bulk modulus 3-6 Ionic crystal 3-7 Madelung energy
Week 9	3-8 Covalent crystal 3-9 Metal crystal 3-10 Hydrogen 3-11-bonded crystal 3-12 Atomic radii,
Week 10	4- Phonons and Lattice vibrations 4-1 phonon Momentum 4-2 Inelastic scattering of photons by long wavelength phonons
Week 11	4-3 Inelastic scattering of neutrons by phonons 4-4 Vibration of monatomic lattices-group velocity 4-5 phase velocity 4-6 Vibrational modes of Lattice with two atoms per primitive cell-Local phonon modes.
Week 12	5- Thermal properties of solids 5-1 Lattice heat capacity

	5-2 Classical model for specific heat 5-3 Einstein model 5-4 Density of modes in one dimension
Week 13	5-5 Density of modes in three dimensions 5-6 Debye model of the lattice heat capacity, Anharmonic crystal interactions 5-7 thermal expansion-thermal conductivity 5-8 Lattice thermal resistivity 5-9 Normal and Umklapp processes.
Week 14	6- Free electron model 6-1 classical free electron theory 6-2 Drude model-Lorentz model 6.3Thermal conductivity for free electron gas, 7- Quantum free electron model 7-1 energy levels and density of state in one dimension-free electron gas in three dimensions
Week 15	7-2 density of state for free electron gas in three dimensions 7-3 -Somerfield's model for metallic conduction 7-4 electrical conductivity,
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: introduce students to some of the equipment they will use in the lab.

Week 2	Lab 2: Ohm's Law
Week 3	Lab 3: Achieving the discharge of a charged capacitor and calculating its time constant
Week 4	Lab 4: Find the internal resistance of the voltmeter
Week 5	Lab 5: Connecting the resistors in series and fulfilling Kirchhoff's voltage law
Week 6	Lab 6: Frequency Response of RLC Circuits
Week 7	Lab 7: Filters

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	I. Introduction to solid state physics C. Kittel	Yes
Recommended Texts	Solid State Physics, J.S.Blakemore	No
Websites		

Grading Scheme
مخطط الدرجات

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

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

Module Information
معلومات المادة الدراسية

Module Title	Basic physics	**Module Delivery**	
Module Type		☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code			
ECTS Credits	4		
SWL (hr/sem)	125 hr		
Module Level	المستوى الذي تدرس فية المادة	**Semester of Delivery**	
Administering Department	Type Dept. Code	**College**	Type College Code
Module Leader	Name	**e-mail**	E-mail
Module Leader's Acad. Title	Assistant Professor	**Module Leader's Qualification**	Ph.D.
Module Tutor	Dr.baqer obaid alnashy	**e-mail**	baqernano@uomisan.edu.iq
Peer Reviewer Name	Name	**e-mail**	E-mail
Scientific Committee Approval Date	11/06/2023	**Version Number**	1.0

Relation with other Modules
العلاقة مع المواد الدراسية الأخرى

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

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

Module Objectives أهداف المادة الدراسية	مثال مادة الاسس الكهربائية يتم كتابة اهداف المادة 1. To introduce the fundamental concepts of physics which provide a foundation for further study of materials, structures, mechanics and electronics at a level necessary to commence an engineering degree programme. 2. To consolidate a common knowledge base and begin the development of a learning methodology appropriate to an engineering degree programme. 3. On successfully completing the module you will be able to... 4. Demonstrate understanding of the fundamentals of physics 5. Apply basic concepts in the analysis of mechanical, electrical and thermal problems
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	مثال مخرجات التعلم يتم كتابة مخرجات المادة Syllabus plan 1. Introduction – physical parameters; dimensions and units; scalar and vector quantities; measurements; conservation of energy 2. Statics – (including forces and moments) 3. Structure of matter 4. Thermal propertiesand heat transport 5. Electrical properties
Indicative Contents المحتويات الإرشادية	يتم كتابة المحتويات الارشادية للمادة حسب المثال ادناه Indicative content includes the following. Part A - Circuit Theory Electrical Circuits: AC Circuits: Kirchhoffs laws for AC circuits, Complex Reactance and Impedance, Series LCR Circuit: (1) Resonance (2) Power

	Dissipation (3) Quality Factor, (4) Band Width, Parallel LCR Circuit.. [15 hrs] Semiconductor Diodes: P and N type semiconductors, energy level diagram, conductivity and Mobility, Concept of Drift velocity, PN junction fabrication (simple idea), Barrier formation in PN Junction Diode, Static and Dynamic Resistance, Current flow mechanism in Forward and Reverse Biased Diode, Drift velocity, derivation for Barrier Potential, Barrier Width and current Step Junction. Two terminal device and their applications: (1) Rectifier Diode: Half- [15 hrs] AC Circuits II - Phasor diagrams, definition of complex impedance, AC circuit analysis with complex numbers. [10 hrs] waveRectifiers.center-tappedandbridgetypeFull-waveRectifiers,Calculation of Ripple Factor and Rectification Efficiency,L and C Filters (2) Zener Diode and Voltage Regulation, Principle and structure of LEDS, (2) Photo diode(3) SolarCell.. [15 hrs] Revision problem classes [6 hrs] <u>Part B - Analogue Electronics</u> Fundamentals Resistive networks, voltage and current sources, Thevenin and Norton equivalent circuits, current and voltage division, input resistance, output resistance, coupling and decoupling capacitors, maximum power transfer, RMS and power dissipation, current limiting and over voltage protection. [15 hrs] Components and active devices – Components vs elements and circuit modeling, real and ideal elements. Introduction to sensors and actuators,

	self-generating vs modulating type sensors, simple circuit interfacing. [7 hrs] Diodes and Diode circuits – Diode characteristics and equations, ideal vs real. Signal conditioning, clamping and clipping, rectification and peak detection, photodiodes, LEDs, Zener diodes, voltage stabilization, voltage reference, power supplies. [15 hrs]

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

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

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Semiconductor introduction
Week 2	Energy band
Week 3	SI and Ge properties'
Week 4	Crystal structure of SI and Ge
Week 5	Mobility in Semiconductor
Week 6	Doping in Semiconductor
Week 7	Types of Semiconductor
Week 8	Drift and diffusions' current in semiconductor
Week 9	P-N junction characteristics
Week 10	diode
Week 11	Load line analysis for diode

Week 12	Diode models
Week 13	Type of diode
Week 14	Series and parallel diode configuration
Week 15	Gates of diode
Week 16	**Preparatory week before the final Exam**

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

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1. ElectronicdevicesandcircuitsR.L.Boylstad(PearsonIndia) 2. Electronic Principles- A.P.Malvino (Tata McGrawHill)	
Recommended Texts	3. Principles of Electronics- V. K. Mehta and Rohit Mehta (S. Chand Publication)	
Websites		

Grading Scheme مخطط الدرجات				
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	A - Excellent	امتياز	90 - 100	Outstanding Performance

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Module Information
معلومات المادة الدراسية

Module Title	**Plasma_physics**	**Module Delivery**	
Module Type	**Core**	☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**PHY31021**		
ECTS Credits	**5**		
SWL (hr/sem)	**150**		

Module Level	UGIV	**Semester of Delivery**	7
Administering Department	Bachelor's degree in Physics (First cycle)	**College**	College of science
Module Leader	Dr. Ahmed Shahab ahmed	**e-mail**	Ahmedshehab@uomisan.edu.iq
Module Leader's Acad. Title	Ass. Professor	**Module Leader's Qualification**	Ph.D.
Module Tutor	Name (if available)	**e-mail**	E-mail
Peer Reviewer Name	Name	**e-mail**	E-mail
Scientific Committee Approval Date	01/06/2023	**Version Number**	1.0

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	**Module aims** Fusion, whether by inertial confinement or magnetic confinement, requires deuterium and tritium to be heated to such high temperatures that the electrons are stripped from the ions. The resulting conducting gas is called a plasma. Plasmas are common place around the universe so the topic of plasma physics is important in many branches of science including astrophysics and solar physics, as well as having industrial applications. This course aims to introduce the basic plasma physics principles through a combination of physical pictures and mathematical analyses, often using examples from fusion to provide specific applications.

Module Learning Outcomes مخرجات التعلم للمادة الدراسية	**Module learning outcomes** **Describe, both through physical pictures and mathematics, the orbits of individual particles in magnetic and electric fields: the cyclotron frequency, the guiding centre, the ExB drift, the gradB and curvature drifts and the polarisation drift.Write down expressions for the quantities that are conserved when a charged particle moves in a magnetic field: energy and magnetic moment. Use this principle to show how charged particles can be trapped in a magnetic mirror. Understand the limitations of a magnetic mirror for confining plasma for fusion** **Demonstrate an understanding of the principles of magnetic confinement in a toroidal magnetic field configuration, including the roles of both the poloidal and toroidal magnetic fields. Describe the basic principles of tokamak operation.** **Describe the process of inertial confinement fusion.** **Describe the physics of Debye shielding and be able to derive the Debye length mathematically. Write down the definitions of a plasma.** **Demonstrate an understanding of the distribution function and how to derive plasma density and flow by integrating over velocity space.** **Without rigorous mathematical derivation, describe how plasma fluid equations can be obtained from the kinetic equations for plasma evolution. Given the fluid equations, describe the physics of the**

	individual terms. Derive the ideal MHD equations from the 2-fluid equations. Describe, without proof, the concept of "frozen in" magnetic field. **Given the fluid equations, derive the diamagnetic drift. Provide a physical explanation for the origin of the diamagnetic drift, including why it is not experienced by a single particle.** **Demonstrate an understanding of equilibria for cylindrical and toroidal plasma systems. Derive the equilibrium relations for cylindrical systems. Describe qualitatively the features of toroidal equilibria including the origin of the Grad-Shafranov equation (without rigorous proof); the concept of toroidal flux surfaces, and definitions of equilibrium quantities such as aspect ratio, safety factor, major and minor radius, etc.** **Perturb and linearise the equilibrium equations. As examples, be able to derive expressions for the frequency of basic plasma waves: Langmuir wave, ion sound wave. Describe the physics responsible for the wave.**

Indicative Contents المحتويات الإرشادية	**Module content** **Syllabus** **Charged particle orbits and drifts** **Magnetic mirror and toroidal magnetic confinement** **Debye shielding and formal definition of a plasma** **Inertial confinement** **Distribution functions and velocity space integration** **Kinetic equation and fluid equations, diamagnetic drift** **Ideal magneto-hydrodynamics (MHD), plasma equilibrium** **Plasma waves: Langmuir wave, sound wave** **- Basic properties of the different space physics bodies/regions (e.g. Sun, planetary magnetospheres) and plasmas (solar wind, magnetospheric plasma, ionosphere) encountered in the Solar System; Origin and loss of these plasmas (e.g., pick-up processes, open magnetosphere); how plasmas interact (solar wind interaction with solar system bodies) and implications (space weather). This will be studied by applying the following theories and concepts: - Debye**

	length; Single particle motion; Kinetic theory; Fluid theory/MHD - Convectively stable; Hydrostatic equilibrium - Kinetic (Vlasov): Distribution functions and electrostatic Langmuir waves - MHD: single-fluid, generalised Ohm's law, ideal MHD, magnetic induction equation, magnetic Reynolds number, frozen-in-field theorem; plasma beta; magnetic reconnection; waves (Alfven, magnetosonic, whistler, shock waves); scale analysis - Fluid: Continuity equation with chemical source and loss Students will familiarise with the manipulation and plotting of spacecraft plasma observations in

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	On completing the Space Physics module, students will be able to: • Classify the main domains where space physics applies and enumerate their properties • Describe and apply the relevant key physical theories that control the properties of different space plasmas and plasma phenomena, • Calculate the quantitative behaviour of different space physics phenomena using plasma physics analysis methods, • Demonstrate an understanding of how space physics has a practical impact on everyday life in the field of space weather, • Identify ways in which experimental studies of space physics phenomena have advanced our understanding of basic plasma physics

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	71	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation
تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Occurrence of Plasmas in Nature . . . . . .1.1 Definition of Plasma . . . . . 1.2 Concept of Temperature. 1.3
Week 2	Debye Shielding 1.4

	The Plasma Parameter 1.5
Week 3	Criteria for Plasmas . . . . . 1.6 Applications of Plasma Physics. 1.7
Week 4	Gas Discharges (Gaseous Electronics) . . . . . .1.8 Controlled Thermonuclear Fusion. 1.9
Week 5	Space Physics . . . . . .2.1 Modern Astrophysics. 2.2
Week 6	MHD Energy Conversion and Ion Propulsion . . . . . 2.3 Solid State Plasmas. 2.4
Week 7	Gas Lasers . . . . . 2.5 Particle Accelerators 2.6
Week 8	Industrial Plasmas . . . . . 2.7 Atmospheric Plasmas. 2.8
Week 9	Single-Particle Motions . . . . . 3.1 Uniform E and B Fields . . . . . 3.2 E = 0 . . . . . 3.3
Week 10	Finite E. . . . . .3.4 Gravitational Field . . . . . 3.5 Nonuniform B Field. 3.6
Week 11	∇B⊥B: Grad-B Drift . . . . . 3.7 Curved B: Curvature Drift. 3.8
Week 12	∇B=B: Magnetic Mirrors. . . . . .4.1 Nonuniform E Field. 4.2
Week 13	Time-Varying E Field 4.3

	Time-Varying B Field. 4.4
Week 14	Plasmas as Fluids . . . . 4.5 Relation of Plasma Physics to Ordinary Electromagnetic. . . . 4.6
Week 15	Maxwell's Equations . . . . 5.1 Classical Treatment of Magnetic Materials 5.2
Week 16	Classical Treatment of Dielectrics. . . . . .5.3 The Dielectric Constant of a Plasma 5.4

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

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1. **Introduction to Plasma Physics and Controlled Fusion Francis F. Chen**	no

Recommended Texts		no
Websites		

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

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

١. اسم المقرر						
تحليل عددي						
٢. رمز المقرر						
قسم علوم الفيزياء- المرحلة الثالثة						
٣. الفصل / السنة						
الفصل الدراسي 2025-2024						
٤. تاريخ إعداد هذا الوصف:						
10/1/2025						
٥. أشكال الحضور المتاحة						
حضوري						
٦. عدد الساعات الدراسية (الكلي)/ عدد الوحدات (الكلي)						
30 ساعة، ٢ ساعات في الاسبوع الواحد*١٥ اسبوع /						
٧. اسم مسؤول المقرر الدراسي (اذا اكثر من اسم يذكر)						
الاسم: م. ميادة جاسم الآيميل @uowasit.edu.iq						
٨. اهداف المقرر						
اهداف المادة الدراسية						**أ- تمكين الطاب من فهم حل المعادلات بطرق عددية وبناء الخوارزمية لكل طريقة** **ب- تمكين الطالب من كتابة الكود الخاص بكل طريقة وتنفيذها ومعالجة الاخطاء الحاسوبية** **ت- أعداد الطلبة إعدادا علميا ومهنيا وثقافيا** **ث- تمكين الطلبة من استخدام التكنولوجيا الحديثة في فهم المقرر** **ج- تمكين الطالب من فهم القيم الاخلاقية الخاصة في البحث العلمي** **ح- تطوير الطلبة على مهارات البحث العلمي وربطها في سوق العمل** **التفاصيل الاساسية للمادة**
٩. استراتيجيات التعليم والتعلم						
الاستراتيجية						**- استخدام التكنلوجيا في التعلم (شاشة العرض و الحاسبات)**
١٠. بنية المقرر						
الأسبوع	**الساعات**	**مخرجات التعلم المطلوبة**	**اسم الوحدة او الموضوع**	**طريقة التعلم**	**طريقة التقييم**	

١	٢س	Main computers components Flowchart and algorithm	**كتابة Code الخاص ال بالطريقة في المختبر**	الالقاء – المناقشة	**أسئلة عامة ومناقشة**
٢	٢س	Solution of equation with one variable Fixed point Iteration Method	**كتابة Code الخاص ال بالطريقة في المختبر**	الالقاء – المناقشة	أسئلة عامة ومناقشة
٣	٢س	Newton-Raphson Iteration Method	**كتابة Code الخاص ال بالطريقة في المختبر**	الالقاء – المناقشة	أسئلة عامة ومناقشة
٤	٢س	Numerical Integration Trapezeidol Method	**كتابة Code الخاص ال بالطريقة في المختبر**	الالقاء – المناقشة	أسئلة عامة ومناقشة
٥	٢س	Numerical Method for first order differential equations	**كتابة Code الخاص ال بالطريقة في المختبر**	الالقاء – المناقشة	أسئلة عامة ومناقشة
٦	٢س	Euler Method	**كتابة Code الخاص ال بالطريقة في المختبر**	الالقاء – المناقشة	أسئلة عامة ومناقشة
٧	٢س	**Formative exam**	**امتحان تقويمي**		امتحان تحريري
٨	٢س	Numerical Differential	**كتابة Code الخاص ال بالطريقة في المختبر**		أسئلة عامة ومناقشة
٩	٢س	Curve fitting and approximation, Least-Squar approximation	**كتابة Code الخاص ال بالطريقة في المختبر**	الالقاء – المناقشة	أسئلة عامة ومناقشة

١٠	٢س	Newton-Raphson Iteration Method	**كتابة Code الخاص ال بالطريقة في المختبر**	الالقاء – المناقشة	أسئلة عامة ومناقشة
١١	٢س	Bisection Method	**كتابة Code الخاص ال بالطريقة في المختبر**	الالقاء – المناقشة	أسئلة عامة ومناقشة
١٢	٢س	Numerical Method for first order differentional equations Eulers Method	**كتابة Code الخاص ال بالطريقة في المختبر**	الالقاء – المناقشة	أسئلة عامة ومناقشة
١٣	٢س	Improved Euler Method,	**كتابة Code الخاص ال بالطريقة في المختبر**	الالقاء – المناقشة	أسئلة عامة ومناقشة
١٤	٢س	Rang Kutta Method	**كتابة Code الخاص ال بالطريقة في المختبر**	الالقاء – المناقشة	أسئلة عامة ومناقشة
١٥	٢س	**Summative exam**	امتحان تقييمي لنهاية المادة		**امتحان تحريري**

١١.تقييم المقرر

توزيع الدرجة من ١٠٠ على وفق المهام المكلف بها الطالب مثل التحضير اليومي والامتحانات اليومية والشفوية والشهرية والتحريرية والتقارير .... الخ

١٢.مصادر التعلم والتدريس

الكتب المقررة المطلوبة	
المراجع الرئيسة (المصادر)	Numerical Analysis for Engineers Methods and Applications, Second Edition

By Bilal Ayyub, Richard H. McCuen	
Numerical Analysis Hardcover – Illustrated, 21 Dec. 2017 by Timothy Sauer (Author)	الكتب والمراجع الساندة التي يوصى بها (المجلات العلمية، التقارير....)
	المراجع الإلكترونية ، مواقع الانترنيت

13. Course Name : numerical analysis	
14. Course Code Department of Physical Sciences - third Stage general physics	
15. Semester / Year	
Semester(2024-2025)	
16. Description Preparation Date:.	
10/1/2025	
17.Available Attendance Forms	
Actual Attendance	
18.Number of Credit Hours (Total) / Number of Units (Total)	
30 hours, 2 hours per week * 15 weeks /	
19. Course administrator's name (mention all, if more than one name)	
Name:D.r Mohanad Sarai Atab Email:matab@uowasit.edu.iq	
20. Course Objectives	
Course Objectives	**- It makes the student familiar and aware of the most important characteristics of the course.** **- Enabling the student to understand the concept of generalized coordinates**

	- Enabling the student to understand complex numbers and represent them **- Enabling the student to understand complex functions, their derivation and integration** **- Enabling the student to understand the concept of publishing functions using immediate strings**

Teaching and Learning Strategies

Strategy	**- Use of technology in learning (display screen and computers)**

21. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	(2 **Th)**	Main computers components Flowchart an algorithm	Write a code in the numerical analysis lab	**Deliverance - discussion**	**General questions and discussion**
2	(2 **Th)**	Solution of equation with one variable Fixed point Iteration Method	Write a code in the numerical analysis lab	**Deliverance - discussion**	**General questions and discussion**
3	(2 **Th)**	Newton-Raphson Iteration Method	Write a code in the numerical analysis lab	**Deliverance - discussion**	**General questions and discussion**

		Bisection Method			
4	(2 **Th)**	Numerical Integration Trapezeidol Method	Write a code in the numerical analysis lab	**Deliverance - discussion**	**General questions and discussion**
5	(2 **Th)**	Numerical Method for fi order differentiona equations Eulers Metho	Write a code in the numerical analysis lab	**Deliverance - discussion**	**General questions and discussion**
6	(2 **Th)**	Euler Method	Write a code in the numerical analysis lab	**Deliverance - discussion**	**General questions and discussion**
7	(2 **Th)**	formative exam			**exam**
8	(2 **Th)**	Numerical Differentiona	Write a code in the numerical analysis lab		**General questions and discussion**
9	(2 **Th)**	Curve fitting and approximatio Least-Squar approximatio	Write a code in the numerical analysis lab	**Deliverance - discussion**	**General questions and discussion**
10	(2 **Th)**	Newton-Raphson Iteration Method Bisection Method	Write a code in the numerical analysis lab	**Deliverance - discussion**	**General questions and discussion**

11	(2 **Th)**	Numerical Method for fi order differentiona equations Eulers Metho	Write a code in the numerical analysis lab	**Deliveran ce - discussio n**	**General questions and discussion**
12	(2 **Th)**	Numerical Method for fi order differentiona equations Eulers Metho	Write a code in the numerical analysis lab	**Deliveran ce - discussio n**	**General questions and discussion**
13	(2 **Th)**	Improved Eul Method,	Write a code in the numerical analysis lab	**Deliveran ce - discussio n**	**General questions and discussion**
14	(2 **Th)**	Rang Kutta Method	Write a code in the numerical analysis lab	**Deliveran ce - discussio n**	**General questions and discussion**
15	(2 **h)**	**Summative exam**			
16	(				

22. 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

Course	Daily preparation, daily and oral exams	Daily assignments	Exam	Final -
1st	5	5	30	40

23. Learning and Teaching Resources

Required textbooks (curricular books any)	

Main references (sources)	Numerical Analysis for Engineers Methods and Applications, Second Edition By Bilal Ayyub, Richard H. McCuen
Recommended books and references (scientific journals, reports…)	**Numerical Analysis Hardcover – Illustrated, 21 Dec. 2017** by Timothy Sauer (Author)
Electronic References, Websites	

1. Course Name	
Material Physics I	
2. Course Code	
Department of Physics Sciences/ Third Stage/ general Physics	
3. Semester / Year	
First Semester (2024-2025)	
4. Description Preparation Date	
1-10-2024	
5. Available Attendance Forms	
Actual Attendance	
6. Number of Credit Hours (Total) / Number of Units (Total)	
2 Practical	
7. Course administrator's name (mention all, if more than one name)	
khamael Ibrahim Abdulwahid khamael_ibrahim@uomisan.edu.iq	
8. Course Objectives	
Course Objectives	1.To familiarize students with the correct methods of sample preparation for microscopic examination 2. To develop the ability to use an optical microscope to observe and document the microstructures of various engineering materials, understanding the principles of magnification, illumination, and resolution.

	3. To perform grain size analysis using dry sieving techniques, gaining practical skills in particle size distribution measurement, data recording, and interpretation according to standard ASTM methods. 4. To conduct impact testing to evaluate material toughness and resistance to sudden fracture, applying methods like Charpy and Izod impact tests, and analyzing fracture characteristics. 5. To execute tensile testing procedures, determining fundamental mechanical properties such as yield strength, ultimate tensile strength, elongation, and reduction in area, according to recognized standards. 6. To plot and interpret stress–strain diagrams, identifying key mechanical behavior regions such as elastic deformation, plastic deformation, yield point, and fracture, fostering a deep understanding of material response under loading. 7. To perform hardness testing using the Brinell method, calculating Brinell Hardness Number (BHN) and understanding its relevance to material strength and wear resistance. 8. To carry out bending tests, measuring flexural strength, elastic modulus, and the behavior of materials under flexural loading to assess their ductility and structural integrity.

9. Teaching and Learning Strategies

Strategy	· The ability to analyze logically The ability to draw and discuss results The ability to know how to use medical materials

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2 pra	Preparation of samples for microsco examination		Presence	**Daily and oral exams and assignments** **Monthly exams for**
2	2 pra	Optical Microscope		Presence	
3	2 pra	Grain Size Analysis By Dry Sieving		Presence	
4	2 pra	Impact Testing		Presence	

5	2 pra	Tensile Testing		Presence	**theoretical subjects** **Reports and daily and monthly exams for practical subjects**
6	2 pra	Plotting a stress – strain diagram		Presence	
7	2 pra	Hardness testing according to Brinell			
		Bending testing			
8		**مراجعة التجارب السابقة**		Presence	
9		**امتحان نهائي**		Presence	

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

Course	daily exams	Daily assignments	Exam1	Exam2	Practical	Final - Exam
1st						

12.Learning and Teaching Resources

Required textbooks (curricular books, if an	Materials Science and Engineering An Introduction
Main references (sourc	**Materials Science and Engineering An Introduction**
Recommended books and references (scientific journals, reports...)	Instruction manual (WP300 Universal Material Tester, 20 kN) by G.U.N.T. Ggeratebau GubH, Germany . Noble, B., Tensile and impact properties of metals and polymers, TQ education and training led product division, 1996. Hashemi, S. Foundations of materials science and engineering, 2006, 4th edition, McGraw-Hill, ISBN 007-125690-3. Noble, B., Tensile and impact properties of metals and polymers, TQ education and training led product division, 1996. Van Vlack, L. H., Elements of Materials Science and Engineering, Addison WesleyPub. Co., (Mass:1994)
Electronic References Websites	

1. Course Name
Material Physics II
2. Course Code
Department of Physics Sciences/ Third Stage/ General Physics
3. Semester / Year
First Semester(2024−2025)
4. Description Preparation Date
1−2−2024
5. Available Attendance Forms
Actual Attendance
6. Number of Credit Hours (Total) / Number of Units (Total)
(2 Theory+2 Practical)
7. Course administrator's name (mention all, if more than one name)
Name: Prof.Dr. Najwa Jassim Jubier **Email: njassim@uowasit.edu.iq**
8. Course Objectives

Course Objectives	**Providing learners with knowledge of the principles of materials physics, developing positive attitudes, and identifying the thermal properties of materials, phases, entropy, enthalpy, cooling curves, nucleation and mechanical properties, the behavior of materials when subjected to loads, and the tests that can be performed on materials.**
Teaching and Learning Strategies	
Strategy	**Creating a competitive atmosphere among students and addressing individual differences using appropriate educational tools and paying attention to feedback to enhance understanding. It is also important to enhance learners' self-confidence to avoid fear of failure, and to apply active learning strategies to stimulate participation and interaction.** **Group discussions and solving assignments**

	Research groups - overlapping discussion circles. **Including teaching methods using educational technology** **Encouraging students to learn independently.**

Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	(2 **Th+2 Pr.)**	**Introduction and ionic cohesive energy**	**Introduction to familiarize students with the second semester curriculum.**	**Presence**	**Daily and oral exams and assignments** **Monthly exams for theoretical subjects** **Reports and daily and monthly exams for practical subjects**
2	(2 **Th+2 Pr.)**	**ionic cohesive energy and Phase equilibrium diagrams**	**Address the force that holds atoms together and analyze the relationship between cohesive energy and material properties such as hardness and melting point, and explain the behavior of materials based on that energy and calculate the Modeling constant. Understand the basics of diagrams such as the relationship between temperature, pressure, and composition of matter.**	**Presence**	

3	(2 **Th+2 Pr.)**	**Cooling curves, Eutectic systems**	**Understanding phase equilibrium diagrams, eutectic systems, cooling curves, how to apply Gibbs equation, solid solutions and their types.**	**Presence**	
4	(2 **Th+2 Pr.)**	**Rate process and crystallization ,kinetics of phase transformatio n, nucleation and growth,**	**Includes understanding of the rate of crystallization, transformation kinetics, and the concept of nucleation and growth.**	**Presence**	
5	(2 **Th+2 Pr.)**	**nucleation kinetics, Heterogeneous nucleation**	**It includes understanding and discussing the free energy equation, types of nucleation, and understanding the difference between homogeneous nucleation and heterogeneous nucleation.**	**Presence**	
6	(2 **Th+2 Pr.)**	**Nucleation Rate, The growth.**	**Understand the relationship between crystallization rate and temperature, surface free energy, and critical nucleus size.**	**Presence**	
7	(2**h.)**	**Exam 1**	**Exam 1**		

8	(2 **Th+2 Pr.)**	**Plotting stress -strain diagram**	**Introduction to mechanical properties, drawing a strain-stress curve, and the relationship of properties to the stractural of the material**	**Presence**	
9	**(2 Th+2 Pr.)**	**physical properties of materials(mechanical properties, true stress–strain curve, shear stress and strain, poisons ratio, fatigue and fracture,**	**Identify all mechanical properties of materials including shear stress and strain, Poisson's ratio, Young's modulus and fracture.**	**Presence**	
10	(2 **Th+2 Pr.)**	**Electrical properties, electron mobility, in metals. conductivity, mobility,**	**Comprehensive understanding of electrical properties Including conductivity and mobility of metal**	**Presence**	
11	(2 **Th+2 Pr.)**	**Work function and electron**	**Identification of semiconductors as materials with a**	**Presence**	

		emission photoemission, semiconductors).	**small energy gap between the conduction band and the valence band and understanding the role of the work function in semiconductors and its relationship to conduction properties.**		
12	(2 **h.)**	**Exam2**	**Exam2**	Presence	
13	(2 **Th+2 Pr.)**	**Experimental techniques for material analysis, DTA, DSC DMS**	**Knowledge of materials testing techniques including thermal analysis**	Presence	
14	(2 **Th+2 Pr.)**	**EDS ,electron microscope ، AFM ,SEM**	**Learn about EDS as a tool for analyzing the chemical elements in materials based on measuring the energy emitted by X-rays after excitation of the material Learn about AFM as a tool for examining surfaces at the atomic level using a microprobe and Learn how to use SEM to analyze surfaces and reveal fine details using bounced or emitted electrons.**	Presence	
15	(2 **Th+2 Pr.)**	**Review**	**Review**	**Review**	
16	(2 **Th+2 Pr.)**		**The preparatory week before the Final Exam**		

9. 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

Course	daily exams	Daily assignments	Exam1	Exam2	Practical	Final - Exam
2nd	4	4	10	10	١٢	60

10. Learning and Teaching Resources

Required textbooks (curricular books any)	**1-Introduction to Solid State Physics BY** Charles Kittel **2- solid state physics** **3.علم المواد د. متي ناصر مقاديسي-**
Main references (sources)	**Materials Science and Engineering An Introduction**
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

13.	Course Name:
	Laser in medicine
14.	Course Code:
15.	Semester / Year:
	Semester
16.	Description Preparation Date:
	2025
17.	Available Attendance Forms:
	Weekly / Theoretical
18.	Number of Credit Hours (Total) / Number of Units (Total)
	30
19.	Course administrator's name (mention all, if more than one name)
	Name: Dr. **Ahmed Shihab Ahmed** Email: **Ahmedshihab@uomisan.edu.iq**
20.	Course Objectives

Course Objectives	**The course aims to study the applications of lasers in medicine to identify them...the applications represented in ...** **Eye surgery, to learn about common diseases that affect the eye and how to tre them with laser, as well as learn about advanced and modern treatment techniques. And also studying the uses of lasers in medicine** **Teeth and knowledge of diseases that are treated with laser, such as gum dise** **and regular fillings And radical, oral orthopedic surgery such as the use of brac As well as plastic surgery and removal Tattoos and cancerous tumors, as well a**
21. Teaching and Learning Strategies **Strategy**	**studying the interaction of the laser with tissues, and understanding how it is absorbed. Light through tissues, in addition to understanding the thermal properties of tissues, enables the student From understanding laser surgery, urology, cardiology and neurology** 1. **Lectures** 2. **Discussion** 3. **Teaching strategies used to develop these skills and abilities** 4. **Laboratory work** 5. **Small group discussion** 6. **Evaluating the scientific values of reports.**

22. Course Structur

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

The first	2	**Know the properties of laser Aswell possibility Its use in the fieldMedical**	**Introduction of laser in medicine**	1-Discussion sessions Competitive offers Presentation 2-Lectures 3-Brainstorming	**Oral exams And ask questions And rapid exams**

The third	2	To know the student Absorption nd emission For light	Laser eye surgery Br	1Discussion sessions Competitive offers Presentation 2-Lectures ainstorming	Oral exams And ask questions And rapid exams
ourth	2	The student ts to know he benefit of laser in medicine The eyes	Types techniques used eye surgery Br	1Discussion sessions Competitive offers Presentation 2-Lectures ainstorming	Oral exams And ask questions And rapid exams
Fifth	2	The student will know how aser works in eye surgery	aser In dentistry Br	1Discussion sessions Competitive offers Presentation 2-Lectures ainstorming	Oral exams And ask questions And rapid exams
Sixth	2	To know the student Uses and mechanism ser work in Eye surgery	Jses of Laser in dentistry Br	1Discussion sessions Competitive offers Presentation 2-Lectures ainstorming	Oral exams And ask questions And rapid exams
Seventh			First Exam		
Eighth	2	To know the student The effect of laser on Cancer cells	Using Laser treat cancer Br		Oral exams And ask questions And rapid exams

Tenth	2	To know the student ser is a good method To break up stones	Lithotripsy	1Discussion sessions Competitive offers Presentation 2-Lectures ainstorming	Oral exams And ask questions And rapid exams
Eleventh	2	To know the student The effect of laser on Vital tissues	Laser interaction with tissue	1Discussion sessions Competitive offers Presentation 2-Lectures ainstorming	Oral exams And ask questions And rapid exams
welfth	2	To know the student The effect of laser on Skin and its treatment	Laser skin treatment.	1Discussion sessions Competitive offers Presentation 2-Lectures ainstorming	Oral exams And ask questions And rapid exams
Thirteenth	2	To know the student he effect of laser on Heart and arterial treatment	Treating heart disease with laser	1Discussion sessions Competitive offers Presentation 2-Lectures ainstorming	Oral exams And ask questions And rapid exams
Fourteenth	2	To know the student Safety procedures When working wit laser	Laser Safety classification	1Discussion sessions Competitive offers Presentation 2-Lectures ainstorming	Oral exams And ask questions And rapid exams
Fifteenth			Second exam.		

23. 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

24. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Siegman, A. E. (1986). Lasers. University science books. Williams, D. (2008). Laser basics. Anaesthesia & Intensive Care Medicine, 9(12), 550-552. Eichler, H. J., Eichler, J., & Lux, O. (2018). Lasers: basics, .advances and applications
Main references (sources)	. Introduction to Laser Physics .Principles of Lasers Laser and their medical application
Recommended books and references (scientific journals, reports...)	search and scientific journals in the specialty
Electronic References, Websites	Internet