Ministry of Higher Education and Scientific Research

Misan University
College of science
Physic Department

Academic Program and Course Description Guide

2025–2026

Introduction:

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

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

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

Concepts and terminology:

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

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

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

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

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

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

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

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

Academic Program 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: / / 2026

Signature:
Scientific Associate Name:
Asst. Prof. Dr. Salah Hassan Faraj
Date: / / 2026

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: / / 2026

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	
General physics Level thee first semester 2025-2026			**theoretical**	**practical**
	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	**PO3201**	**Physical Optics**	٢	٢

Level thee second semester 2025-2026	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 2025-2026	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 2025-2026				
	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 2025-2026	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 2025-2026	**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 2025-2026	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 2025-2026	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	• 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.

student's conceptual side.	
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. • Building mathematical and quantitative foundations for students in the Department of General and Medical Physics	• Acquire computer skills and basic software for analyzing physical data, such as the Mathlab program and Excel program.
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	• Create a safe classroom environment that encourages free expression without fear of criticism.

expression	• 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.

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

• 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. Ahmed Hashim Aboud 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.

• Explaining academic publishing procedures and scientific research ethics.

• 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 2025–2026	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 First level Second semester 2025–2026	PHY1202	Magnetism	Basic	√	√	√	√	√	√	√	√	√	√	√	√
	PHY1200	Democracy	Basic	√	√	√	√	√	√	√	√	√	√	√	√
	PHY1201	Mechanics and Properties of Matter (2)	Basic	√	√	√	√	√	√	√	√	√	√	√	√
	UNI1202	General Astronomy	Basic	√	√	√	√	√	√	√	√	√	√	√	√
	PHY120	Mathematics (2)	Basic	√	√	√	√	√	√	√	√	√	√	√	√

	3														
	SCI1204	Computers (2)	Basic	√	√	√	√	√	√	√	√	√	√	√	√
	PHY1205	English Language (1)	Basic	√	√	√	√	√	√	√	√	√	√	√	√
General physics Second level first semester 2025–2026	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	√	√	√	√	√	√	√	√	√	√	√	√
General physics Second level Second	PHY2201	Modern Physics (2)	basic	√	√	√	√	√	√	√	√	√	√	√	√
	AM2202	Analytical Mechanics (2)	basic	√	√	√	√	√	√	√	√	√	√	√	√
	PHY2203	Thermodynamics and Statistics (2)	basic	√	√	√	√	√	√	√	√	√	√	√	√
	PHY2204	Digital Electronics	basic	√	√	√	√	√	√	√	√	√	√	√	√

semester 2025–2026	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 2025–2026	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 2025–2026	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	√	√	√	√	√	√	√	√	√	√	√	√
	3207	Elective (2)	Elective	√	√	√	√	√	√	√	√	√	√	√	√
Medical physics Third level First	MPA311	Anatomy	basic	√	√	√	√	√	√	√	√	√	√	√	√
	MPPA312	Medical Physics (1)	basic	√	√	√	√	√	√	√	√	√	√	√	√
	MPDRA313	Diagnostic Radiology Physics (1)	basic	√	√	√	√	√	√	√	√	√	√	√	√

semester 2025–2026	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 2025–2026	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	ET4203	Electromagnetic Theory (2)	basic	√	√	√	√	√	√	√	√	√	√	√	√
	MP4204	Mathematical Physics (2)	basic	√	√	√	√	√	√	√	√	√	√	√	√
	PP4205	Plasma Physics	basic	√	√	√	√	√	√	√	√	√	√	√	√

first semester 2025–2026	BP4206	Biophysics	basic	√	√	√	√	√	√	√	√	√	√	√	√
	NP4207	What is it?	basic	√	√	√	√	√	√	√	√	√	√	√	√
	NP4208	Research Project	basic	√	√	√	√	√	√	√	√	√	√	√	√
	ET4203	Electromagnetic Theory (2)	basic	√	√	√	√	√	√	√	√	√	√	√	√
General physics Fourth level Second semester 2025–2026	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 Fourth level First semester 2025–2026	MPMI411	Medical Devices (1)	basic	√	√	√	√	√	√	√	√	√	√	√	√
	MBRB412	Radiation Biology	basic	√	√	√	√	√	√	√	√	√	√	√	√
	MPPM413	Nuclear Medicine Physics	basic	√	√	√	√	√	√	√	√	√	√	√	√
	MPIP414	Image Processing	basic	√	√	√	√	√	√	√	√	√	√	√	√
	MPE415	English	basic	√	√	√	√	√	√	√	√	√	√	√	√
	MPRP416	Research Project	basic	√	√	√	√	√	√	√	√	√	√	√	√
		Optional (3)	Elective	√	√	√	√	√	√	√	√	√	√	√	√
Medical	MPMI41	Medical Devices	basic	√	√	√	√	√	√	√	√	√	√	√	√

physics Fourth level Second semester 2025–2026	1	(1)													
	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.**

المستوى الثالث

Module Information
معلومات المادة الدراسية

Module Title	فسلجة طبية	**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	١. تزويد الطلاب بفهم لتركيب ووظيفة عدد من الأجهزة الفسيولوجية الرئيسية ودورها في توازن الجسم. ٢. دراسة فسيولوجيا الإنسان كنموذج للعمليات الفسيولوجية في الكائنات الحية الأخرى. ٣. وصف مجموعة من الأنسجة والعمليات الفسيولوجية لدى الإنسان بشكل تمهيدي. ٤. ربط العمليات الفسيولوجية بأسسها على المستوى الخلوي. ٥. القدرة على فهم وتحليل العمل التجريبي في علم وظائف الأعضاء. ٦. القدرة على تطبيق مهارات حل المشكلات على المشكلات العملية في علم وظائف الأعضاء، بما في ذلك استخدام الرياضيات وتحليل البيانات. ٧. تطوير المزيد من المهارات البيولوجية العملية التي تم تقديمها في مقرر علم وظائف الأعضاء.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	١. مقدمة تمهيدية بالعمليات الخلوية والكيميائية الحيوية التي تُشكّل أساس العمليات الفسيولوجية لدى البشر. ٢. إظهار فهم للآليات الخاصة المستخدمة لنقل جزيئات مختارة لا تستطيع عبور الغشاء البلازمي بمفردها: الناقل؛

	البلعمة الخلوية؛ الإخراج الخلوي. ٣. وصف تشريح وفسيولوجيا عدد من الأنظمة الفسيولوجية الرئيسية، والتحكم فيها، والضرورية لوظائف جسم الإنسان. ٤. المعرفة الأساسية بالاتصالات بين الخلايا تعتمد بشكل كبير على الرسل الكيميائية خارج الخلوية: الباراكرين، والناقلات العصبية، والهرمونات العصبية. ٥. شرح المبادئ وحل المسائل في فسيولوجيا الإنسان. ٦. معرفة تمهيدية بفسيولوجيا العمليات الرئيسية، مثل الجهاز القلبي الوعائي، والجهاز العصبي، والجهاز الهضمي، والجهاز التنفسي، والغدد الصماء، والجهاز التناسلي لدى البشر. ٧. إظهار فهم لمستويات تنظيم الأنظمة الفسيولوجية الرئيسية، من الخلايا إلى الوظائف. ٨. المعرفة الأساسية لإجراء وتحليل وتسجيل التجارب والملاحظات في علم وظائف الأعضاء. ٩. ربط معرفة الأنظمة الفسيولوجية بآليات التوازن الداخلي المحددة والتحكم فيها. ١٠. التعرف على هياكل الأنسجة الرئيسية لفهم الأنظمة الفسيولوجية الرئيسية.
ndicative Contents المحتويات الإرشادي	محاضرات نظرية: تعلم مفاهيم كل محاضرة نظرية أو مجموعة محاضرات. محاضرات مختبرية: تعلم مفاهيم كل محاضرة مختبرية أو مجموعة محاضرات.

earning and Teaching Strategies استراتيجيات التعلم والتعلي	
Strategies	المحاضرات: في المحاضرات، يقدّم المدرِّسون المحتوى للطلاب من خلال عروض تقديمية شفهية. وغالبا ما يعزز المحاضرة بشرائح أ وسائط متعددة أو منشورات لتسهيل الفهم ورش العمل: تُعزِّز ورش العمل المعرفة والفهم للموضوع المكتسب من المحاضرات، وتُنمِّي المهارات الأساسية والخاصة بالموض يُسهم التعلُّم الذاتي في المعرفة الخاصة بالموضوع والتحفيز الذاتي الامتحانات تحقيق المستوى المناسب من المعرفة الخاصة بعلم وظائف الأعضاء، مع التركيز على الفهم والتواصل (أسئلة المقال والمشكلة أو استرجاع المعرفة الواقعية (اختبارات الاختيار من متعدد أو أسئلة الإجابة القصيرة الدروس الخصوصية: الدروس الخصوصية هي جلسات في مجموعات صغيرة يديرها مدرِّس، حيث يمكن للطلاب طرح الأسئلة، والحصول على دعم فردي، وتوضيح المفاهيم التي تناولتها المحاضرات أو القراءات تحليل عملي قائم على المعرفة الخاصة بالموضوع، ويظهر مهارات خاصة بالموضوع في فهم العمل التجريبي وتحليل البيانات تُمكّن التمارين العملية الطلاب من الاستفادة من المعرفة الخاصة بموضوعهم المكتسبة من المحاضرات، وتدعم تطوير المهارات الأساسي والخاصة بموضوعهم الفصل الدراسي المقلوب: في نموذج الفصل الدراسي المقلوب، يعرف الطلاب على مواد المقرر الدراسي من خلال أنشطة تعليمية ذاتي

	خارج الفصل (مثل مشاهدة المحاضرات المسجلة مسبقًا أو قراءة النصوص)، مما يتيح وقتًا للمناقشات التفاعلية وحل المشكلات والأنشطة العملية

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوع			
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					
As		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	
Week	Material Covered
Week 1	مقدمة في فسلجة الخلية
Week 2	الاسس العامة والخلوية في الفسلجة الطبية
Week 3	الجهاز القلبي الوعائي : الوظيفة والاعضاء والامراض
Week 4	توليد وتوصيل النبضة القلبية
Week 5	فسلجة الجهاز العصبي ١
Week 6	فسلجة الجهاز العصبي ٢
Week 7	امتحان منتصف الفصل
Week 8	فسلجة العضلات
Week 9	فسلجة الكلية
Week 10	الجهاز الهضمي ١: التركيب والانسجة
Week 11	الجهاز الهضمي ٢ : الهضم والامتصاص
Week 12	تشريح وفسلجة الجهاز التنفسي
Week 13	الغدد الصماء ١

Week 14	الغدد الصماء ٢
Week 15	تنظيم الحرارة
Week 16	الامتحان النهائي

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week	**Material Covered**
Week 1	القواعد العامة للمختبر وإجراءات السلامة
Week 2	مقدمة في فسيولوجيا الدم.
Week 3	تقدير الهيموغلوبين
Week 4	حجم خلايا الدم المرصوص
Week 5	العدد الكلي لخلايا الدم الحمراء
Week 6	العدد الكلي لخلايا الدم البيضاء
Week 7	العدد التفاضلي لخلايا الدم البيضاء
Week 8	معدل ترسيب كريات الدم الحمراء
Week 9	زمن التخثر والنزيف
Week 10	فصائل الدم
Week 11	ضغط الدم.
Week 12	تجارب على الجهاز التنفسي
Week 13	تنظيم الأنسولين لسكر الدم
Week 14	تخطيط كهربية القلب
Week 15	الامتحان

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** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**
Module Code	**PHY32025**		
ECTS Credits	**6**		
SWL (hr/sem)	**150**		

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	01/06/2025	**Version Number**	1.0

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

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

	he 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

trategies	he main strategy that will be adopted in delivering this module is to encourage tudents' participation in the exercises, while at the same time refining and expanding heir critical thinking skills. This will be achieved through classes, interactive utorials and by considering type of simple experiments involving some sampling ctivities that are interesting to the students.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

tructured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**tructured 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	**he propagation of Light** .1 One-Dimensional Waves .2 Harmonic Waves .3Phase and Phase Velocity
Week 2	.4 The Superposition Principle .5 The Complex Representation .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

	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	**Laser physics**	**Module Delivery**	
Module Type	**Core**	☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**PHY31018**		
ECTS Credits	**5**		
SWL (hr/sem)	**150**		
Module Level	UGx11 UGIV	**Semester of Delivery**	7
Administering Department	Bachelor's degree in Physics (First cycle)	**College**	College of science

Module Leader	د.ستار حسين سولي	**e-mail**	baqernano@uomisan.edu.iq
Module Leader's Acad. Title	مدرس	**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	01/06/2025	**Version Number**	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

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

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	Aims of the Course: **To make the students understand laser physics and nonlinear optics and enable them to practically apply their knowledge in research and development. Pivotal experiments will be shown during the lecture. The acquired knowledge will be dealt with in depth in the exercise groups. An additional offer: interested students may build and investigate a nitrogen laser device.-**
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	**Module learning outcomes** • Construct energy level diagrams of the fine structure of hydrogen and hydrogen-like ions. • Describe the origin of sub-shells, terms and multiplets for atoms with two or more electrons not in closed sub-shells. • Describe molecular energy levels, including vibrational and rotational levels. • Derive the relationship between the Einstein coefficients. • Determine a general formula for laser gain in a generalised four-level laser. • Derive an expression for Doppler broadening of a line profile. • Describe mode locking of a laser cavity. • Describe the operation of helium-neon and carbon dioxide lasers. • Describe how lasers can be used to cool atoms to form, for example, Bose-Einstein condensates.

	Contents of the Course: Laser physics: advanced geometric optics and wave optics (ABCDmatrix, Gauss rays, wave guides). Light-matter interaction (spontaneous/ excited processes, inversion, light intensification). Principle of the laser; mode of operation and properties of lasers (standing wave-/ring laser, mode condition, hole burning). Continuous wave laser (gas, solid states), pulsed laser (Q-switching, mode coupling), optical properties of semiconductors, semiconductor laser; dynamic properties of laser light (Schawlow-Townes line width, chaotic laser radiation). Petawatt laser, white light laser, free electron laser, laser application in telecommunications, metrology and material processing; Nonlinear Optics: Frequency doubling, sum-, difference frequency generation, parametric oscillators, phase matching (critical, non-critical, quasi), photorefraction, nonlinear Kerr effect, 4-wave mixing
Indicative Contents المحتويات الإرشادية	Module content **Syllabus** The quantum mechanics of atoms is introduced by re-visiting the hydrogen atom. Spin orbit splitting and the Lamb shift are introduced leading to a qualitative treatment of fine structure. Exchange parity and the Pauli exclusion principle are presented leading to a discussion of the structure of atoms with more than one electron. The inter-electron Coulomb and spin orbit interactions are introduced leading to a discussion of LS coupling and jj-coupling when there are two or more electrons not in closed sub-shells. The concept of sub-shells, terms and multiplets is presented. Molecular energy levels are introduced starting with the hydrogen molecule ion H_2^+. Vibrational and rotational states are discussed. The interaction of light with atoms and molecules is further explored by re-visiting the Einstein A and B coefficient. This leads to a discussion on lasers and the gain coefficient. The concept of the lineshape function is introduced – Doppler broadening is considered. Laser cavities are briefly discussed leading to the concepts of longitudinal modes and mode locking. Helium-neon and carbon dioxide lasers are discussed. The technique of laser cooling is presented with a brief discussion of Bose-Einstein condensates.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Differentiate characteristics of the laser emission that are limited by physical principles from those that are limited by existing technology. 1. Identify if some characteristics of laser emission are needed for a specific application. 2. Determine the parameters of a laser for a specific application. 3. Select the mechanism to generate pulses for a specific application. 4. Assemble the different parts of a laser. 5. Check the proper functioning of a laser by characterizing its output. 6. Justify the design of a laser cavity for a specific application

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	Chapter one 1. Visible Spectrum 2. Absorption of electromagnetic Radiation 3. Boltzmann Distribution Equation 4. Processes between Photons and Atoms 5. Mechanisms of Light Emission
Week 2	1. Lasing Process 2. Properties of Laser Radiation 3. Spot Size Measurement 4. Numerical Calculation of Power Density
Week 3	Chapter two

	1. Population Inversion and Boltzmann 2. Statistics Einstein Coefficients 3. The Gain coefficien
Week 4	1. Basic components of a Laser system 2. Two level laser configuration systems 3. three-, level laser configuration systems 4. four-level laser configuration systems
Week 5	Chapter three 1. Standing Waves In A Laser
Week 6	1. Allowed Frequencies inside a Laser Cavity 2. The Number of Longitudinal Optical Modes 3. Gain Curve of the Active Medium
Week 7	1. The transverse distribution of intensity 2. Shape of Transverse Electromagnetic Modes 3. properties of Basic Gaussian Transverse Mode Lowest divergence angle
Week 8	4. The most common optical cavities 5. The stability criterion for laser cavity 6. Laser Gain 7. Loop Gain 8. Calculating Loop Gain (GL) Without Losses 9. Calculating Loop Gain (GL) With Losses
Week 9	Chapter four 1. Fluorescence Linewidth 2. Mathematical Expressions of fluorescence linewidth 3. Laser Gain Curve 4. Threshold Gain Coefficient
Week 10	5. Broadening the Fluorescence line 6. Natural broadening 7. Doppler Broadening 8. Pressure (collisions) .broadening
Week 11	Exam
Week 12	Chapter five 1. types of lasers 2. Solid-state lasers 3. Semiconductor lasers 4. Dye lasers 5. Gas lasers 6. diode lasers
Week 13	Chapter six 1. Rate equation analysis
Week 14	2. Line Shapes and Broadening 3. Homogenous and Inhomogenous Broadening 4. Laser Beam Profile

Week 15	5. The properties and propagation of a Gaussian laser beam:
Week 16	6. Q. switching

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
	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

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Module Information

معلومات المادة الدراسية

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

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسي	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 الدراسي	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 أسبوعا	5.3
Unstructured SWL (h/sem.) الحمل الدراسي غير المنتظم للطالب خلال الفصل	71	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعا	4.7

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%)	3,10	,2,3,6,8,9,11
	Assignments	2	10(10%)	5,12	,10
	Projects / Lab.	1	10(10%)		
	Report	1	10(10%)		,12
Summative assessment	Midterm Exam	1	10(10%)	8	-8
	Final Exam	1	50(50%)	16	-14
Total assessment			100(100%)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	ntroduction 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

Week	Material Covered
Week 1	General laboratory rules and safety procedures
Week 2	ntroduction 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

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 الدراسي	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

	ecall of factual knowledge (multiple choice or short answerquestion tests) Tutorials: Tutorials are small-group sessions led by a tutor, where students an 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

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	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

Week	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
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Module Information

معلومات المادة الدراسية

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

Module Level	UGx11 1	**Semester of Delivery**	1 semester 2022-2025
Administering Department	Type Dept. Code	**College**	Type College Code
Module Leader	**Dr. Dalya Khaled Naser**	**e-mail**	hmedkhalafzager@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	01/06/2025	**Version Number**	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

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

Module Aims أهداف المادة الدراسية	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	Know the importance of medical physics in diagnosis and treatment. Learn about treatment by understanding the physics of the devices used. Learn about medical physics diagnostic methods. Understand how to protect patients and workers from the risks of using various devices in diagnosis and treatment. Understand radiation units and assess dangers due to radiation exposure and study some medical applications of radiation. • U

Indicative Contents المحتويات الإرشادية	Indicative content includes the following. . Define the requirement : Computer hardware and program define hardware and oftware algorithm ,flowchart to design the program . Development: implementation the software using computer to solve problems by writing code source. . Testing : test the software and program to integrate the woke study . Maintenance : to enhancement education and fix error . Evaluation education to disposal

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

trategies	❖ Class lectures (theory) ❖ La boratory practical lectures

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

tructured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	90	**tructured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوع	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	35	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوع	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation

تقييم المادة الدراسية

As		**Time/Number**	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
ormative ssessment	**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
ummative ssessment	**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	ntroduction of medical physics
Week 2,3	Light in medicine (introduction ,properties of light, measurement of light and its units, application of visible light in nedicine, application of microscope in medicine, application of infrared in medicine, application of ultraviolet and infrared n 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

Week	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 **Recommended Resources** • Medical Journals and Medical Physics Journals	No
Websites	• Electronic 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	UGx11 1	**Semester of Delivery**	1 semester 2022-2025
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	01/06/2025	**Version Number**	1.0

Date			

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 ectures. 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

Assessment		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

t	Report	1	10% (10)	13	LO # 5, 8 and 10
Summati	Midterm Exam	2 hr	10% (10)	7	LO # 1-7
ve assessme nt	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	ntroduction to Plasma Physics, Definition, characteristics of plasma, examples n 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	ndustrial and Medical Applications of Plasma
14	Review & Final Assessment

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

Week	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*	No

	of Plasma Physics • **Donald A. Gurnett & Amitava Bhattacharjee** – *ntroduction to Plasma Physics: With Space and Laboratory Applications*	
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 ystem (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
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	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

1. المؤسسة التعليمية	جامعة ميسان كلية العلوم
2. القسم العلمي / المركز	قسم الفيزياء
3. اسم / رمز المقرر	رياضيات Mathematics
4. أشكال الحضور المتاحة	فعلي والكتروني
5. الفصل / السنة	الاولى
6. عدد الساعات الدراسية (الكلي)	90 ساعة
7. تاريخ إعداد هذا الوصف	2021/10/12
8. أهداف المقرر	

تدريس مواضيع مادة الرياضيات مع حل العديد من التمارين وتوضيح الجانب التطبيقي لهذه الموضوعات المهمة في حياتنا.

9. مخرجات المقرر وطرائق التعليم والتعلم والتقييم:

أ- الأهداف المعرفية:

أ1- حل المعادلات الرياضية.

أ2- كيفية تمثيل المعادلات وحلها باستخدام الحاسوب. أ3- كيفية تمثيل المسالة رياضيا وحلها.

ب - الأهداف المهاراتية الخاصة بالمقرر:

ب1 –حل المعادلات الرياضية باستخدام الحاسبة.

ب2- توظيف بعض اساسيات الرياضيات وربطها في بناء النماذج الرياضية.

طرائق التعليم والتعلم:

1- طريقة المحاضرة.

2- الامثلة العملية وتطبيقها على العناوين المهمة. 3- العصف الذهني.

4- المناقشة والحوار والاقناع.

طرائق التقييم:

1- الاختبارات التحريرية.

2- المشاركة بالمحاضرة.

ج- الأهداف الوجدانية والقيمية :

ج1-تشجيع الطلبة على استخدام الحاسبات لحل المسائل الرياضية المعقدة وكيفية تمثيلها بغية ادخالها الى الحاسوب. ج2- فهم المسائل الرياضية.

د - المهارات العامة والتأهيلية المنقولة (المهارات الأخرى المتعلقة بقابلية التوظيف والتطور الشخصي): د1- قدرة الطلبة على حل المسائل الرياضية بواسطة الحاسبة.

د2- القابلية على توظيف المهارة المكتسبة لفهم المهارات المتعلقة.

10. بنية المقرر:

الأسبوع	الساعات	مخرجات التعلم المطلوبة	اسم الوحدة / أو الموضوع	طريقة التعليم	طريقة التقييم
1	3	التعرف على الدوال	الدوال (تعريفها :خواصها: انواع الدوال)	نظري	الاختبارات
2	3	التعرف على الدوال	الدوال (تعريفها :خواصها: انواع الدوال)	نظري	الاختبارات
3	3	التعرف على الدوال	المجال والمدى للدوال: رسم	نظري	الاختبارات
4	3	التعرف على الغايات	الغايات (تعريفها: وطرق حساب الغايات)	نظري	الاختبارات
5	3	التعرف على الغايات	مواضيع اخرى في الغايات: الاستمرارية	نظري	الاختبارات
6	3	التعرف على الغايات	الغايات والاستمرارية للدوال الزائدية	نظري	الاختبارات
7	3	التعرف على الغايات	الغايات والاستمرارية للدوال الزائدية	نظري	الاختبارات
8	3		امتحان شهري	نظري	الاختبارات
9	3	التعرف على المصفوفات	المصفوفات (تعريفها: انواعها والعمليات عليها)	نظري	الاختبارات
10	3	التعرف على المصفوفات	المصفوفات (المقلوب: المعكوس للمصفوفات المربعة)	نظري	الاختبارات
عطلة نصف السنة					
11	3	التعرف على المحددات	المحددات (رتبها: خواصها :حل تمارين)	نظري	الاختبارات
12	3	الدوال	معكوس الدوال	نظري	الاختبارات
13	3	انواع الدوال	الدوال الزائدية	نظري	الاختبارات
14	3	التعرف على المشتقات	المشتقة (طرقها: المشتقات الضمنية: حل تمارين)	نظري	الاختبارات
15	3	انواع المشتقات	المشتقات الجزئية والمشتقات للدوال الزائدية	نظري	الاختبارات
16	3	انواع المشتقات	المشتقات الجزئية والمشتقات للدوال الزائدية	نظري	الاختبارات
17	3		امتحان شهري	نظري	الاختبارات
18	3	التكامل	التكامل (تعريفه: طرق التكامل)	نظري	الاختبارات
19	3	طرق التكامل	التكامل (تعريفه: طرق التكامل)	نظري	الاختبارات

20	3	طرق التكامل	التكامل (طرق التكامل: التكامل المحدد)	نظري	الاختبارات
21	3	تطبيقات التكامل	تطبيقات على التكامل: حل تمارين	نظري	الاختبارات
22	3		امتحان شهري	نظري	الاختبارات
23	3	المتتابعات والمتسلسلات	المتتابعات والمتسلسلات	نظري	الاختبارات

24	3	المتتابعات والمتسلسلات	المتتابعات والمتسلسلات	نظري	الاختبارات
25	3	المتجهات	المتجهات (مقدمة وحل تمارين)	نظري	الاختبارات
26	3	الاعداد	الاعداد العقدية (تعريفها: خواصها)	نظري	الاختبارات
27	3		حل تمارين	نظري	الاختبارات
28	3		امتحان شهري	نظري	الاختبارات
29	3	الاحداثيات القطبية	مقدمة في نظام الاحداثيات القطبية	نظري	الاختبارات
30	3		حل تمارين	نظري	الاختبارات

11. البنية التحتية:	
1- الكتب المقررة المطلوبة	1- Calculus – James Stewart 2- Engineering Mathematics– K. A. Stroud– Second Edition. 3-Calculus – Howard Anton – Sixth Edition. 4-"Mathematics for computer science", Eric Lehman, F. Thomson Leighton , Albert R. Meyer,2017
2- المراجع الرئيسية (المصادر)	نفس المذكورة اعلاه.
ا- الكتب والمراجع التي يوصى بها (المجلات العلمية، التقارير .....)	المصادر المذكورة اعلاه تفي بالغرض.
ب - المراجع الالكترونية, مواقع الانترنيت	اليوتيوب و ملفات تنزل على المودل و عروض تقديمية تنزل على المودل بالأضافة الى الدروس التفاعلية الالكترونية.

12. خطة تطوير المقرر الدراسي:
نعتمد مفردات اللجنة القطاعية.

١. اسم المقرر
تحليل عددي
٢. رمز المقرر
علوم الفيزياء– المرحلة الثالثة قسم
٣. الفصل / السنة
الفصل الدراسي ٢٠٢٥–٢٠٢٦
٤. تاريخ إعداد هذا الوصف:
10/1/2025
٥. أشكال الحضور المتاحة
حضوري
٦. عدد الساعات الدراسية (الكلي)/ عدد الوحدات (الكلي)
ساعة، ٢ ساعات في الاسبوع الواحد*١٥ اسبوع / 30
٧. اسم مسؤول المقرر الدراسي (اذا اكثر من اسم يذكر)
ميادة جاسم محمد
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 ال Code الخاص بالطريقة في المختبر**	الالقاء – المناقشة	أسئلة عامة ومناقشة
٢	٢س	Solution of equation with one variable Fixed point Iteration Method	**كتابة ال Code الخاص بالطريقة في المختبر**	الالقاء – المناقشة	أسئلة عامة ومناقشة
٣	٢س	Newton-Raphson Iteration Method	**كتابة ال Code الخاص بالطريقة في المختبر**	الالقاء – المناقشة	أسئلة عامة ومناقشة
٤	٢س	Numerical Integration Trapezeidol Method	**كتابة ال Code الخاص بالطريقة في المختبر**	الالقاء – المناقشة	أسئلة عامة ومناقشة
٥	٢س	Numerical Method for first order differentional equations	**كتابة ال Code الخاص بالطريقة في المختبر**	الالقاء – المناقشة	أسئلة عامة ومناقشة

٦	٢س	Euler Method	كتابة ال Code الخاص بالطريقة في المختبر	الالقاء – المناقشة	أسئلة عامة ومناقشة
٧	٢س	**Formative exam**	امتحان تقويمي		امتحان تحريري
٨	٢س	Numerical Differentional	كتابة ال Code الخاص بالطريقة في المختبر		أسئلة عامة ومناقشة
٩	٢س	Curve fitting and approximation, Least-Squar approximation	كتابة ال Code الخاص بالطريقة في المختبر	الالقاء – المناقشة	أسئلة عامة ومناقشة
١٠	٢س	Newton-Raphson Iteration Method	كتابة ال Code الخاص بالطريقة في المختبر	الالقاء – المناقشة	أسئلة عامة ومناقشة
١١	٢س	Bisection Method	كتابة ال Code الخاص بالطريقة في المختبر	الالقاء – المناقشة	أسئلة عامة ومناقشة
١٢	٢س	Numerical Method for first order differentional equations Eulers Method	كتابة ال Code الخاص بالطريقة في المختبر	الالقاء – المناقشة	أسئلة عامة ومناقشة
١٣	٢س	Improved Euler Method,	كتابة ال Code الخاص بالطريقة في المختبر	الالقاء – المناقشة	أسئلة عامة ومناقشة
١٤	٢س	Rang Kutta Method	كتابة ال Code الخاص بالطريقة في المختبر	الالقاء – المناقشة	أسئلة عامة ومناقشة
١٥	٢س	**Summative exam**	امتحان تقييمي لنهاية المادة		امتحان تحريري

١١. تقييم المقرر

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

اسم المقرر
مواد عامة - العملي
رمز المقرر
الفصل / السنة
الفصل الثاني / ٢٠٢٥-٢٠٢٦
تاريخ إعداد هذا الوصف
1-10 ٢٠٢٥-
أشكال الحضور المتاحة
حضوري
عدد الساعات الدراسية (الكلي)/ عدد الوحدات (الكلي)
٢ /٢
اسم مسؤول المقرر الدراسي (اذا اكثر من اسم يذكر)
الاسم: م.خمائل ابراهيم
اهداف المقرر

اهداف المادة الدراسية	التعرف على المواد و استخداماتها فهم الأسس الفيزيائية النظرية و العملية لدراسه خواص المواد التعرف على انواع المواد و تفاصيل استخدامها في التطبيقات العامه التأهيل للعمل في مجالات متعددة معرفة الطالب على مقارنة النتائج المستحصلة عمليا مع النتائج النظرية ومناقشه النتائج

استراتيجيات التعليم والتعلم

الاستراتيجية	القدرة على التحليل المنطقي القدرة على رسم ومناقشة النتائج القدرة على معرفة استخدام المواد

بنية المقرر

الأسبوع	الساعات	مخرجات التعلم المطلوبة	اسم الوحدة او الموضوع	طريقة التعلم	طريقة التقييم
١	٢		**Preparation of samples for microscopic examination**	عملي	اختبارات تحريرية وعملية
٢	٢		**Optical Microscope**	عملي	=
٣	٢		**Grain Size Analysis By Dry Sieving**	عملي	=
٤	٢		**Impact Testing**	عملي	=

٥	٢		**Tensile Testing**	عملي	=
٦	٢		**Plotting a stress – strain diagram**	عملي	=
٧	٢		**Hardness testing according to Brinell**	عملي	=
			Bending testing	عملي	=
٩			**مراجعة التجارب السابقة**		
10			**امتحان نهائي**		

تقييم المقرر

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

الإمتحانات الشهرية	**المشروع او التقرير**	**الدرجة الشهرية للمادة النظرية**	**الإمتحان النهائي**
6	**6**	**٢٨**	**٦٠**
			٤٠ (نظري) +٢٠ (عملي)

مصادر التعلم والتدريس

الكتب المقررة المطلوبة (المنهجية أن وجدت)	William D. Callister, Jr.,"Materials Science and Engineering", 7th ed. By John Wiley & Sons, Ins. 2007.
المراجع الرئيسة (المصادر)	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.
الكتب والمراجع الساندة التي يوصى بها (المجلات العلمية، التقارير....)	Van Vlack, L. H., Elements of Materials Science and Engineering, Addison WesleyPub. Co., (Mass:1994)
المراجع الإلكترونية، مواقع الانترنيت	

Module Information

معلومات المادة الدراسية

Module Title	**English Language II**	**Module Delivery**	
Module Type	**S**	☒ **Theory**	
Module Code	**UNI2104**	☒ **Lecture**	
ECTS Credits	٢	☐ **Lab**	
SWL (hr/sem)	٥٠	☒ **Tutorial**	
		☐ **Practical**	
		☐ **Seminar**	

Module Level	UGx11 UGII	**Semester of Delivery**	3
Administering Department	Bachelor's degree in Physics (First cycle)	**College**	College of science
Module Leader	***Sajjad Qassim***	**e-mail**	**enana@uomisan.edu.iq**
Module Leader's Acad. Title	***Assis. Lecturer***	**Module Leader's Qualification**	Ms. C.
Module Tutor	Name (if available)	**e-mail**	E-mail
Peer Reviewer Name	Name	**e-mail**	E-mail
Scientific Committee Approval Date	١١/06٨/2025	**Version Number**	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	UNI1103	**Semester**	2
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	***1.*** *New Headway Beginner, this course aim that both Teachers and students can rely.* ***2.*** *An authoritative integrated syllabus.* ***3.*** *Motivating topics.* ***4.*** *Clearly focused tasks combine with a real understanding of what works in the classroom.* ***5.*** *It all makes for effective teaching and effective learning.*
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	***1.*** *Full-length foundation course for absolute beginners or near beginners lacking in confidence.* ***2.*** *Grammar syllabus introducing past, present, and future time.* ***3.*** *Vocabulary syllabus focusing on key, high-frequency items, avoiding unnecessary overload.* ***4.*** *Manageable communicative activities putting language into context.* ***5.*** *Staged step-by-step approach building on students' skills and confidence.* **6.** *Clear, fresh design with plenty of photos and illustration.*

Indicative Contents المحتويات الإرشادية	- - *Reading books in the specialist, to overcome of good writing in English Language.* - *Listening a lot for the English content such as Movies, repots, and news, to overcome of good speaking in English Language*

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering 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	٣٣	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	٢
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	١٧	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	٢
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	٥٠		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	3	15% (15)	4,7, 11	LO #1,3, 5,6,9 and 10
	Assignments	2	10% (10)	3, 12	LO # 2,4, 7and 11
	Projects / Lab.	0	0% (10)	Continuous	All
	Report	1	15% (15)	13	LO # 5 and 10
Summative assessment	Midterm Exam	2 hr	10% (10)	8	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

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** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**PHY32025**		
ECTS Credits	**6**		
SWL (hr/sem)	**150**		

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	01/06/2025	**Version Number**	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

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

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	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 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 أسبوع	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	71	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوع	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	**he propagation of Light** 1.1 One-Dimensional Waves 1.2 Harmonic Waves 1.3Phase and Phase Velocity
Week 2	1.4 The Superposition Principle 1.5 The Complex Representation 1.6 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
	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	3		
SWL (hr/sem)	50		

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	

١٢. اسم المقرر
فيزياء المواد ١
١٤. رمز المقرر
قسم علوم الفيزياء- المرحلة الثالثة / عام/طبية
١٥. الفصل / السنة
الفصل الدراسي االاول ٢٠٢٥-٢٠٢٦
١٦. تاريخ إعداد هذا الوصف
1-2-2025
١١. أشكال الحضور المتاحة
حضوري
١٨. عدد الساعات الدراسية (الكلي)/ عدد الوحدات (الكلي):
ساعة عملي) اسبوعيا2(٢ ساعة نظري +
١٩. اسم مسؤول المقرر الدراسي (اذا اكثر من اسم يذكر)
khamael Ibrahim Abdulwahid khamael_ibrahim@uomisan.edu.iq
٢٠. اهداف المقرر

اهداف المادة الدراسية	على المفاهيم والتعرف الايجابية الاتجاهات وتنمية المواد فيزياء بمبادئ المعرفة المتعلمين اكساب

	يركز على دراسة وفهم الخواص الفيزيائية والكيميائية والميكانيكية والتركيبية للمواد المختلفة حيث,الاساسيا بهدف تطوير مواد جديدة وتحسين خصائص المواد الحالية لتلبية احتياجات صناعية وتقنية متقدمة. يدمج علم المواد بين الفيزياء والكيمياء والهندسة لدراسة العلاقة بين البنية الداخلية للمواد وخواصها وأدائها

٢١. استراتيجيات التعليم والتعلم

ستراتيجيا	**خلق اجواء المنافسة بين الطلبة وعلاج الفروقات الفردية باستخدام الوسائل التعليمية المناسبة والاهتمام بالتغذية الراجعة لتعزيز الفهم. من المهم أيضًا تعزيز ثقة المتعلمين بأنفسهم لتجنب الخوف من الفشل، وتطبيق استراتيجيات التعليم النشط لتحفيز المشاركة والتفاعل** المناقشات الجماعية وحل الواجبات **المجاميع البحثية – الحلقات النقاشية المتداخلة** **تضمين طرائق التدريس استعمال لتكنولوجيا التعلي** **تشجيع الطلبة على التعلم الذاتي**

٢٢. بنية المقرر

الأسبوع	الساعات	مخرجات التعلم المطلوبة	اسم الوحدة او الموضوع	طريقة التعلم	طريقة التقييم
١	٢س ن + ٢س ع	فهم المبادئ الأساسية لفيزياء المواد وأهميتها في .دراسة خصائص المو	**Introduction about material physics**	حضوري	الامتحانات اليومية والشفوي والواجبا والامتحانات الشهرية بالنسب للمادة النظر التقارير والامتحانات اليومي والشهرية بالنسبة للعملي
٢	٢س ن + ٢س ع	**التعرف على الفروقات بين المواد البلورية وغير البلورية من حيث البنية والتركيب الذري.** **فهم مفهوم الشبكة البلورية ونماذجها المختلفة مثل البرافيسية الشبكات (Bravais lattices).**	**Crystal structure(crystalline and amorphous material) the crystalline of solids Baravais lattice and crystal translation vectors elements of crystal structure**	حضوري	
٣	٢س ن + ٢س ع	التعرف وفهم الانظمة والشبائك البلوية الخطية وذات البعدين والثلاثة ابعاد وطبيعة الترتيب الدوري للذرات داخل المواد الصلد وانواع ومميزات نظام المكعب	**Two and three dimensional lattices, type of cubic and volume of cubic**	حضوري	
٤	٢س ن + ٢س ع	التعرف على معاملات للاوجهه للنظام المكعب وكيفية ايجاد المسافة بين المستويات البلورية	**Indices of the faces**	حضوري	
٥	٢س ن + ٢س ع	**التعرف على كيفية تمثيل الاتجاهات في البلورات وكذلك السطوح باستخدا معاملات ميل.** **والتعرف على كيفية حساب الزاوية بير مستويين بلوريين وكذلك بين اتجاهير داخل البلورة باستخدام مؤشرات ميل الخاصة بهم.**	**Miller indices of direction and the angle between two planes and two directions**	حضوري	
٦	٢س ن + ٢س ع	ايجاد الكثافة وعامل الرص الذري للشبائك المكعب	**Density and packing factor**	حضوري	
٧	٢س	امتحان الشهر الاول	**Exam 1**	حضوري	
٨	٢س ن + ٢س ع	فهم التراكيب المغلقة الرص ومنها السداسي وكيفية رسمه وتحديد السطوح وايجاد حجمه وعامل الرص الذري له	**Close packed structures, hexagonal close packed structures**	حضوري	

٩	٢س ن +٢س	التعرف على مفهوم حيود الأشعة في البلورات وكيفية استخدامه لتحليل بنية المواد. والتعرف على أنواع الأشعة المستخدمة في تجارب الحيود البلوري	Crystal diffraction, the incident beam used for crystal diffraction, X-rays, neutron, electron.	حضوري	
١٠	٢س ن +٢س	التعرف على قانون براغ الذي يصف علاقة الحيود بين الأشعة السينية والمستويات البلورية في البلورات. الفهم الكامل للعلاقة الرياضية في قانون براغ التي تربط بين زاوية الحيود (θ) ، وطول الموجة للأشعة السينية(λ) ، والمسافة بين المستويات البلورية (d)	Bragg law, determination of X-ray wave length, and inter atomic distance	حضوري	
١١	٢س ن +٢س	التعرف على مفهوم الشبكة المعكوسة كأداة رياضية تساعد في تحليل ظواهر الحيود في البلورات. فهم الفرق بين الشبكة البلورية العادية والشبكة المقلوبة وكيفية استخدام الشبكة المقلوبة في تمثيل الخصائص الفيزيائية للمواد. فهم مفهوم منطقة بريلوين كمنطقة في الشبكة المقلوبة التي تُستخدم لتحليل الخواص التعرف على كيفية رسم الإلكترونية للمواد مناطق بريلوين للبلورات المختلفة واستخدامها في دراسة التفاعل بين الإلكترونات والأشعة السينية.	Reciprocal lattice concept ,Reciprocal lattice vectors Diffraction Conditions Brillouin zones and Bragg law	حضوري	
١٢	٢س	امتحان الشهر الثاني	Exam2	حضوري	
١٣	٢س ن +٢س	التعرف وفهم كيفية ايجاد حجوم الشبائك الاولية في الفضاء المقلوب	Reciprocal Lattice to S.C Lattice Reciprocal Lattice to bcc Lattice Reciprocal Lattice to fcc Lattice	حضوري	
١٤	٢س ن +٢س	التعرف على أنواع الروابط البلورية المختلفة التي تربط الذرات أو الأيونات داخل البلورات.	Crystal binding (the vender walls bond, ionic crystals covalent crystal, metal crystal, Hydrogen bonded crystal	حضوري	
١٥	س2	مراجعة	Review		
١٦	س2	الأسبوع التحضيري قبل الامتحان النهائي			

٢٢. تقييم المقرر

٢٤. اسم المقرر
فيزياء المواد ٢
٢٥. رمز المقرر
قسم علوم الفيزياء- المرحلة الثالثة / عام
٢٦. الفصل / السنة
الفصل الدراسي االاول ٢٠٢٥-٢٠٢٦
٢٧. تاريخ إعداد هذا الوصف
1-2-2025
٢٨. أشكال الحضور المتاحة
حضوري
٢٩. عدد الساعات الدراسية (الكلي)/ عدد الوحدات (الكلي):
ساعة عملي) اسبوعيا2(٢ ساعة نظري +
٣٠. اسم مسؤول المقرر الدراسي (اذا اكثر من اسم يذكر)
خمائل ابراهيم عبد الواحد khamael Ibrahim Abdulwahid khamael_ibrahim@uomisan.edu.iq

٣١. اهداف المقرر

اهداف المادة الدراسية	تزويد المتعلمين بالمعرفة بمبادئ فيزياء المواد، وتنمية الاتجاهات الإيجابية، والتعرف على الخصائص الحرارية للمواد والأطوار، والإنتروبيا، والانثالبي ، ومنحنيات التبريد، والتنوي والخصائص الميكانيكية، وسلوك المواد عند تعرضها للأحمال والاختبارات التي يمكن إجراؤها على المواد

٣٢. استراتيجيات التعليم والتعلم

الاستراتيجيات	خلق اجواء المنافسة بين الطلبة وعلاج الفروقات الفردية باستخدام الوسائل التعليمية المناسبة والاهتمام بالتغذية الراجعة لتعزيز الفهم. من المهم أيضًا تعزيز ثقة المتعلمين بأنفسهم لتجنب الخوف من الفشل، وتطبيق استراتيجيات التعليم النشط لتحفيز المشاركة والتفاعل المناقشات الجماعية وحل الواجبات المجاميع البحثية – الحلقات النقاشية المتداخلة تضمين طرائق التدريس استعمال لتكنولوجيا التعلي تشجيع الطلبة على التعلم الذاتي

٣٣. بنية المقرر

الأسبوع	الساعات	مخرجات التعلم المطلوبة	اسم الوحدة او الموضوع	طريقة التعلم	طريقة التقييم
١	٢س ن +٢س ع	مقدمة لتعريف الطلب بمنهاج الفصل الثاني	Introduction and ionic cohesive energy	حضوري	الامتحانات اليومي
٢	٢س ن +٢س ع	التطرق الى القوة التي تمسك الذرات وتحليل العلاقة بين طاقة التماسك وخصائص المواد مثل الصلابة ودرجة الانصهار وتفسير سلوك المواد بناء على تلك الطاقة وحساب ثابت مودلنك. استيعاب	ionic cohesive energy Phase equilibrium diagrams	حضوري	والشفوي والواجبات والامتحانات الشهري بالنسب للماد النظري

			أساسيات المخططات مثل العلاقة بين درجة الحرارة، الضغط، وتكوين المادة.		التقارير والامتحانات اليومية والشهرية بالنسبة للعملي
٣	٢س ن +٢س ع	مخططات اتزان فهم الطور (Phase Equilibrium Diagram والانظمة اليوتكتيكية ومنحنيات التبريد وكيفية تطبيق معادلة جبس والمحاليل الجامدة وانواعها	Cooling curves, Eutectic systems	حضوري	
٤	٢س ن +٢س ع	يتضمن فهم معدل العملية والتبلور وحركيات التحول ومفهوم التنوي والنمو	Rate process and crystallization ,kinetics of phase transformation, nucleation and growth,	حضوري	
٥	٢س ن +٢س ع	يتضمن فهم واشتقاق معادلة الطاقة الحرة وانواع التنوي واستيعاب الفرق بين التبلور المتجانس (Homogeneous Nucleation) والتبلور غير المتجانس (Heterogeneous Nucleation).	nucleation kinetics, Heterogeneous nucleation	حضوري	
٦	٢س ن +٢س ع	فهم العلاقة بين معدل التبلور ودرجة الحرارة الطاقة الحرة السطحية والحجم الحرج للنوا.	Nucleation Rate, The growth.	حضوري	
٧	٢س	امتحان الشهر الاول	Exam 1	حضوري	
٨	٢س ن +٢س ع	مقدمة عن الخواص الميكانيكية ورسم منحني انفعال – اجهاد وعلاقة الحواص بتركيب المادة	Plotting stress - strain diagram	حضوري	
٩	٢س ن +٢س ع	التعرف على كافة الحصائص الميكانيكية للمواد منها اجهاد وانفعال القص ونسبة بواسون ومعامل يونك والكسر	physical properties of materials(mechanical properties, true stress-strain curve, shear stress and strain, poisons ratio, fatigue and fracture,	حضوري	
١٠	٢س ن +٢س ع	فهم شامل للخواص الكهربائية	Electrical properties, electron mobility, in	حضوري	

		metals. conductivity, mobility,	منها التوصسلية والتحركية للمعدن		
١١	٢س ن +٢س ع	التعرف على أشباه الموصلات كمواد لها فجوة طاقة صغيرة بين نطاق التوصيل ونطاق التكافو. فهم دور دالة الشغل في أشباه الموصلات وعلاقتها بخصائص التوصيل.	Work function and electron emission (photoemission, semiconductors).	حضوري	
١٢	٢س	امتحان الشهر الثاني	Exam2	حضوري	
١٣	٢س ن +٢س ع	المعرفة بتقنيات فحص المواد منها التحاليل الحرارية	Experimental techniques for material analysis, DTA, DSC DMS	حضوري	
١٤	٢س ن +٢س ع	التعرف على تقنية EDS كأداة لتحليل العناصر الكيميائية في المواد بناء على قياس الطاقة المنبعثة من الأشعة السينية بعد إثارة المادة التعرف على كأداة لفحص AFM تقنية السطح عند مستوى الذرات باستخدام مسبار دقيق. التعرف على كيفية لتحليل SEM استخدام الأسطح والكشف عن التفاصيل الدقيقة باستخدام الإلكترونات المرتدة أو المنبعثة.	EDS ,electron microscope AFM ,SEM	حضوري	
١٥	س2	مراجعة	Review		
١٦	س2	الأسبوع التحضيري قبل الامتحان النهائي			

٣٤. تقييم المقرر

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

الفصل الدراسي	الامتحانات اليومية	الواجبات اليومية	الامتحان الشهري ١	الامتحان لبشهري ٢	العملي	الامتحان النهائي
الثاني	٤	٤	١٠	١٠	١٢	٤٠ النظري +٢٠ عملي

٣٥. مصادر التعلم والتدريس

الكتب المقررة المطلوبة (المنهجية أن وجدت	
1-Introduction to Solid State Physics BY Charles Kittel 2- solid state physics	

المراجع الرئيسة (المصادر	**-علم المواد د. متي ناصر مقاديسي.3** **Materials Science and Engineering An Introduction**
الكتب والمراجع الساندة التي يوصى بها (المجلات العلمية، التقارير....	
المراجع الإلكترونية ، مواقع الانترنيت	

٣٦. اسم المقرر
تحليل عددي العملي
٣٧. رمز المقرر
علوم الفيزياء– المرحلة الثالثة قسم
٣٨. الفصل / السنة
الفصل الدراسي ٢٠٢٥–٢٠٢٦
٣٩. تاريخ إعداد هذا الوصف:
10/1/2025
٤٠. أشكال الحضور المتاحة
حضوري
٤١. عدد الساعات الدراسية (الكلي)/ عدد الوحدات (الكلي)
ساعة، ٢ ساعات في الاسبوع الواحد*١٥ اسبوع / 30
٤٢. اسم مسؤول المقرر الدراسي (اذا اكثر من اسم يذكر)
الاسم: ميادة جاسم محمد الآيميل
٤٣. 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**

٤٤. استراتيجيات التعليم والتعلم
لاستراتيجيا استخدام التكنلوجيا في التعلم (شاشة العرض و الحاسبات)
٤٥. بنية المقرر

الأسبوع	الساعات	مخرجات التعلم المطلوبة	اسم الوحدة او الموضوع
١	٤س	Main computers components Flowchart and algorithm	بالطريقة الخاصة بالمختبر codeكتابة
٢	٤س	Solution of equation with one variable Fixed point Iteration Method	بالطريقة الخاصة بالمختبر codeكتابة
٣	٤س	Newton-Raphson Iteration Method	بالطريقة الخاصة بالمختبر codeكتابة
٤	٤س	Numerical Integration Trapezeidol Method	بالطريقة الخاصة بالمختبر codeكتابة
٥	٤س	Numerical Method for first order differentional equations	كتابة ال Code الخاص بالطريقة في المختبر
٦	٤س	Euler Method	كتابة ال Code الخاص بالطريقة في المختبر
٧	٤س	Formative exam	امتحان تقويمي
٨	٤س	Numerical Differentional	كتابة ال Code الخاص بالطريقة في المختبر
٩	٤س	Curve fitting and approximation, Least-Squar approximation	كتابة ال Code الخاص بالطريقة في المختبر
١٠	٤س	Newton-Raphson Iteration Method	كتابة ال Code الخاص بالطريقة في المختبر
١١	٤س	Bisection Method	كتابة ال Code الخاص بالطريقة في المختبر
١٢	٤س	Numerical Method for first order differentional equations Eulers Method	كتابة ال Code الخاص بالطريقة في المختبر
١٣	٤س	Improved Euler Method,	كتابة ال Code الخاص بالطريقة في المختبر
١٤	٤س	Rang Kutta Method	كتابة ال Code الخاص بالطريقة في المختبر
١٥	٤س	Summative exam	امتحان تقييمي لنهاية المادة

Level Four

Module Information

معلومات المادة الدراسية

Module Title	**nuclear physics I**	**Module Delivery**	
Module Type	**Core**		☒ **Theory**
Module Code	**PHY32025**		☒ **Lecture**
ECTS Credits	**5**		☒ **Tutorial**
SWL (hr/sem)	**150**		☐ **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. 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 وReaction 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

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	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

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
	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

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	5		
SWL (hr/sem)	150		

Module Level	UGx11 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	01/06/2025	**Version Number**	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

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

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	1. 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 17. Classification of solid material, atomic binding 18. Crystalline materials, lattice vectors, unit cells 19. Reciprocal space, Brillouin zones 20. X-ray diffraction, Bragg's law, von Laue equations 21. Lattice vibrations, phonons, heat capacity 22. Free electron model, resistance in metals, Hall effect 23. Band structure, Bloch wave functions, introduction to band structure calculations 24. 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

Assissment		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	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

Week	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	. Introduction to solid state physics C. Kittel	Yes
Recommended Texts	olid State Physics, J.S.Blakemore	No
Websites		

Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
uccess Group 50 - 100)	**A** - Excellent	امتياز	0 - 100	utstanding Performance
	B - Very Good	جيد جدا	0 - 89	bove average with some errors
	C - Good	جيد	0 - 79	ound work with notable errors
	D - Satisfactory	متوسط	0 - 69	air but with major shortcomings
	E - Sufficient	مقبول	0 - 59	ork meets minimum criteria
ail Group 0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	45-49)	ore work required but credit awarded
	F – Fail	راسب	0-44)	onsiderable amount of work required

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 الماد		**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	11/06/2025		**Version Number**	1.0	

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

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

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسي	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 الدراسي	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] Part B - Analogue Electronics Fundamentals Resistive networks, voltage and current sources, Thevenin and Norton equivalent circuits, current and voltage division, input resistance, output resistance, coupling and decoupling capacitors, maximum power transfer, RMS and power dissipation, current limiting and over voltage protection. [15 hrs] Components and active devices – Components vs elements and circuit modeling, real and ideal elements. Introduction to sensors and actuators, self-generating vs modulating type sensors, simple circuit interfacing. [7 hrs] Diodes and Diode circuits – Diode characteristics and equations, ideal vs real. Signal conditioning, clamping and clipping, rectification and peak detection, photodiodes, LEDs, Zener diodes, voltage stabilization, voltage reference, power supplies. [15 hrs]
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	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

Assissment		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

Week	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

Week	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

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

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	UGx11 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	01/06/2025	**Version Number**	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

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

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	**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** 1. Charged particle orbits and drifts 2. Magnetic mirror and toroidal magnetic confinement 3. Debye shielding and formal definition of a plasma 4. Inertial confinement 5. Distribution functions and velocity space integration 6. Kinetic equation and fluid equations, diamagnetic drift 7. Ideal magneto-hydrodynamics (MHD), plasma equilibrium

	3. 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

Assissment					
ormative ssessment	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
ummative ssessment	Midterm Exam	2 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
otal assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	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

Week	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	. 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.

Module Information

معلومات المادة الدراسية

Module Title	منهج بحث	Module Delivery	
Module Type	Elcive	☒ Theory ☒ Lecture Lab Tutorial ☐ Practical ☐ Seminar	
Module Code	PHY31021		
ECTS Credits	2		
SWL (hr/sem)			

Module Level	UGIII UGIII	Semester of Delivery	5
Administering Department	Bachelor's degree in Physics (First cycle)	College	College of science
Module Leader	Dr. Ahmed Khalaf zager	e-mail	hmedkhalafzager@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	01/06/2025	Version Number	1.0

أهداف المقرر

يستطيع الطالب بعد أتمام المقرر الدراسي أن :-

يفهم البحث العلمي وأساليبه

يتقن أهم مهارات البحث العلمي

فهم و أساليب التعامل مع المراجع والمصاد

أهم معايير وخطواط كتابه البحث العملى

تتقن كتابه البحث العلمي

تذكر أهم أساليب الاحصائيه المستخدمة في تحليل نتائج البحوث

كتابة بحث المرحلة الرابع

وبايثون SPSS وبرنامج Wordاستخدام الكومبيتر في متابة واعدا البحث باستخدام برنامج الورو

أدوات مفيدة (مواقع) لتحديد موضوع البحث أو الكلمات الرئيسية ورسم خرائط البحث

مثل :-

Google scholar
nstaGrok
KeyWords Plus
Google AdWords
Science Direct
IEEE

Microsoft Academic Searc
مخرجات المقرر وطرائق التعليم والتعلم والتقييم
الأهداف المعرفية الفهم : القدرة على التفكير المنطقي السليم التطبيق : القدرة على إعداد بحوث رصينة في مجالات البحث العلمي في حقل الكيمياء التقويم : تقييم البحث المعد من قبل كل طالب ، تقييم الأنشطة اللاصفية ، تقييم الاختبارات الفصلية

الأسبوع	الساعات	مخرجات التعلم المطلوبة	اسم الوحدة / أو الموضوع	طريقة التعليم	طريقة التقييم
١	٢	بتعرف الطالب معنى البحث ومعنى المنهج والرسالة والاطروحة وبحث المرحلة الرابعة (بحث التخرج) ويتعرف الطالب ايضا على أدوات مفيدة (مواقع الكترونية) لتحديد موضوع البحث أو الكلمات الرئيسية ورسم خرائط البحث مثل ❖ google scholars ❖ Research academic ❖ Science direct ❖ IEEE	**مقدمة عن منهج البحث العلمي**	**المحاضرة والشرح**	**الأسئلة والمناقشة**
٢	٢	يتعرف الطالب أنواع البحث العلمي و هيكلية البحث الأكاديمي ١. العنوان Title ٢. الملخص Abstract ٣. المقدمة Introduction ٤. الدراسات السابقة literature review ٥. المنهجية Methodology ٦. النتئج Result ٧. المصادر References	مفهموم البحث العلمي وأنواعه وخطوات كتابته	المحاضرة والشرح	الأسئلة والمناقشة
٣	٢	يتعلم الطالب كيف يكتب عنوان البحث يتعلم الطالب كيف يكتب ملخص	١. <u>عنوان البحث</u> .كيف تجد واختبار موضوع البحث أو العنوان الخاص	PTTعرض	الأسئلة والمناقشة + امتحان يومي

		بحص • يتعلم الطالب كيف يكتب مقدمة	بك. ٢. الملخص ٢ ماذا يحتوي الملخص ٣. أشياء يجب تجنبها في الملخص. ٣. المقدمة • ما هو حدث وجود البحث؟ • ما هي المشكلة التي لم يحلها هذا الحدث؟ • من الذي يعاني من هذه المشكلة؟ • ما سبب أهمية حل هذه المشكلة؟ • كيف يمكنك حلها؟ • ما هي الطرق الموصى بها والمناسبة لحلها؟ • ما هي فوائد هذا العمل؟ • ما هي النتائج التي تفعلها مسبقًا وستكون مقاربة		
		يتعلم الطالب كيف يكتب الدراسات السابقة . يتعلم الطالب كيف يحصل على النتائج . يتعلم الطالب كيف يحصل على المصادر وكتابتها .	الدراسات السابقة • كيفية إجراء بحث عن الدراسات السابقة ؟ • كيف تكتب مراجعة نقدية ومنهجية للدراسات السابقة ؟	المحاضرة والشرح	الأسئلة والمناقشة
		يتعلم الطالب كيف يكتب المنهجية	من أجل قياس بحثك بطريقة منهجية ، فإنك تحتاج إلى أدوات تسمى الطرق يجب أن تجيب المنهجية على الأسئلة التالية:		

		• هل الأساليب المختارة تعتمد على نوع إجراء البحث؟ • هل هذه الأساليب تجيب على أسئلة البحث الخاصة بك • هل هذه الأساليب مدعومة في مراجعة الأدبيات؟ • هل هذه الطرق حديثة أم متقدمة؟			
٦		معالجة البيانات	يتعلم الطالب معالجة البيانات باستخدام برنامج الوورد واستخدا للحصول على SPSSبرنامج النتئج		
		النتائج	يتعلم الطالب كيف يحصل ويكتب على النتائج		
٧	٢	الفصل الرابع : دعم البحث بمصادر أساسية وثانوية	تعلم المراجع الأساسية والمراجع الثانوية	المحاضرة والشرح	الأسئلة والمناقشة
٨	٢	طرق أخذ المعلومة من المصادر (الاختصار– أعادة الصياغة – الاقتباس المباشر .	تعلم أخذ المعلومة وأضافتها على البحث العلمي	عرض Data Show	الأسئلة والمناقشة
٩	٢	مقدمه البحث + الفصل الأول+الفصل الثاني + الخلاصة	تعلم صياغة الجانب النظري للبحث	المحاضرة والشرح	الأسئلة والمناقشة
١٠	٢	الاقتباس المباشر والغير مباشر	تعلم الطالب الاقتباس المباشر	المحاضرة والشرح	الأسئلة والمناقشة
١٢	٢	تجنب السرقة العلمية	فهم الطالب مفهوم السرقة العلميةPlagiarism	المحاضرة والشرح	الأسئلة والمناقشة

١٣	٢	تعلم الطالب الاقتباس المباشر القصير + الاقتباس المباشر الطويل	أنواع الاقتباس	المحاضرة والشرح	الأسئلة والمناقشة
١٤	٢	فهم الطالب توثيق المصادر	الفصل التاسع : أنواع المصادر	المحاضرة والشرح	الأسئلة والمناقشة
١٥	٢	أعداد المصادر في نهاية البحث	ترتيب المصادر في نهاية البحث باستخدام الحاسوب	عرضData Show	الأسئلة والمناقشة + امتحان يومي

١.
٢. البنية التحتية
٣.

١. الكتب المقررة المطلوبة	Writing Research Paper
٢. المراجع الرئيسية (المصادر)	Research Methodology: Methods and Techniques English for Writing Research work \
ب. المراجع الالكترونية، مواقع الانترنيت	https://www.sciencedirect.com eeexplore.ieee.org/ https://scholar.google.com/ www.iasj.net www.tu.edu.iq

٤. خطة تطوير المقرر الدراسي (مقترحات)

١. شمول طلاب منهج البحث ساعتين اضافية عملي يتعلم الطالب من خلالها الطرق والادوات المتاحة في قواعد البيانات الرصينة في الانترنيت والتي تساعد الطالب على كتابة بحثه بطرق علمية وتقنية سليمة واستخدام برامج الوورد ونوت و بزو ومنيد ماب وكثير من الرامج المهمة التي تساعد الطالب في كتابة منهجة بشكل رائع ومميز.

٢. تخصيص جزء تطبيقي أو عملي داخل المكتبة بحيث يتعرف الطالب عمليا على كيفية البحث عن قضاية التي تتعلق بقسم الكيمياء واستنباط المعلومات الكائنة بين ثنايا الكتب، وطريقة التدرج بها من المصادر القديمة إلى المراجع الكتب الحديثة . تجهيز قاعات دراسية مناسبة للطلاب ، مقاعد مريحة ، أجهز عرض، أجهزة تلفزيونية وأشرطة فيديو تعليمية ، أجهزة مبيوتر ، مكتبة مزودة بالمراجع متخصصة للقسم . وجود أعضاء هيئة التدريس لتقديم المشورة والنصح والإرشاد الأكاديمي للطالب المحتاج ذلك، وتهيئة الجو العلمي للأستاذ الجامعي ليستفيد ويفيد.

Grading Scheme
مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
Success Group	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors

(50 - 100)	**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	**Mathematical Physics I**	**Module Delivery**	
Module Type	**Core**	☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**PHY41032**		
ECTS Credits	**5**		
SWL (hr/sem)	**150**		

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	01/06/2025	**Version Number**	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

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

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims

أهداف المادة الدراسية

Module aims

The Applied Module for Mathematics and Physics in Stage 2 aims to introduce some of the main ideas and theories of modern applied mathematics and mathematical physics, along with some of the main mathematical methods that are used to study and solve problems in these theories. Working alongside the modules provided in the Physics department, the aim is to present a mathematical viewpoint, but still in the context of applications, so that theory and technique progress in tandem. The overall aim is to lay the foundations for the further study of applied mathematics and mathematical physics in Stages 3 and 4.

As part of these broad aims, this module has the following components

- **Classical Dynamics** (Spring) presents a sophisticated form of Newton's laws known as analytical mechanics, which also forms an important component of modern theories of both classical and quantum physics.

	• **Waves and Fluids** (Spring/Summer), exploring the the dynamics of continuous media, focusing on elementary fluid dynamics and the motion of waves. This lays the foundations for the full development of fluid dynamics in stages 3 and 4, as well as for modules on electromagnetism and quantum mechanics. The mathematical techniques of vector calculus are employed and further developed, as are Fourier methods.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	• **<u>Module learning outcomes</u>** • Subject content • **Classical Dynamics** • **Lagrangian mechanics**. Constraints, generalized coordinates, Lagrange's equations, connection to Newton's laws. Constants of the motion: ignorable coordinates and Jacobi's function. Qualitative analysis of systems with a single degree of freedom using Jacobi's function. Examples, including conservative central forces and the Lagrangian analysis of the spinning top. • **Hamiltonian mechanics**. Generalized momenta and the Hamiltonian. Derivation of Hamilton's equations from Lagrange's equations. Conservation results. Poisson brackets. Equations of motion and conservation laws in Poisson bracket form. • **Phase-plane techniques**. Trajectories and equilibria for conservative and damped systems. • **Variational principles**. Reformulation of Lagrangian mechanics (and Hamiltonian, if time permits) in variational form. Examples of other variational problems (e.g., brachistochrone, geodesics on a plane and sphere). •
Indicative Contents المحتويات الإرشادية	**<u>Aims:</u>** There are several aims of this module: 1. Break down possible barriers between physics and mathematics, learn their differences and similarities and thus be able to translate from one level of description to another. 2. Build up mathematical intuition from anologies with physical problems. Absolute majority of good mathematicians use physical analogies to guide their research. 3. Familiarise students with the main concepts of theoretical physics to broaden their horizons. 4. Provide motivation and connections for other modules and to explain the practical applications of undergraduate mathematics studied in the department.

	Assessable learning outcomes: By the end of the module students will be familiar with the physical concepts of vectors, vector and scalar fields and will be able to apply them to formulate mathematical problems from physical description. The main skill we will be developing during the module is the ability to separate important factors from the unimportant and to create models of different levels of sophistication. We shall also learn how to analyze solutions from the physical point of view and to use Taylor series to derive tractable simplifications.

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	**Outline content:** 1. Mechanics and ODEs 2. Vector operators and frame invariance 3. Guitar strings and wave equation: simplest PDEs 4. Fluid motion, current, diffusion, heat transfer 5. Probability and statistical mechanics 6. Introduction to electro-magnetism 7. Physical origins of boundary conditions

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		

odule 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	1. partial Differential Equations 1.1 Classification of PDE's 1.2 Cauchy data 1.3 Wave equation
Week 2	2.Matrices and vector spaces 2,1 Vector spaces 2.2 Basis vectors; 2.3 inner product; 2.4 some useful inequalities
Week 3	2.5 Linear operators 2.6 Matrices
Week 4	3. Special Functions 3.1 Curvilinear co-ordinates 3.2 Spherical harmonics 3.3 Bessel functions .
Week 5	3.4 Taylor and Laurent Series 3,5 Gama function
Week 6	3.6 Complex Functions 3.7 Analytic Functions
Week 7	3.8 Beta function
Week 8	3.9 Laplace transform for the function 3.10 Inverse Laplace
Week 9	Exam
Week 10	4. Conformal Maps 4.1 Integration of Complex Functions 4.2 Derivativesas Integrals
Week 11	4.3 Legemder function
Week 12	5. Tensors 5.1 Covariant and contravariant vectors 5,2 Cartesian tensors
Week 13	5,3 Algebra of Tensors 5.4 Multilinear Mappings 25. 5.5 Symmetries of Tensor
Week 14	6. Fourier Series and Integrals. 6.1 Fourier series . 6.2 Fourier integral transforms
Week 15	6.3 The inverse discrete Fourier transform
Week 16	6.4 The Euler–Lagrange equation

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

Week	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	Mathematical Physics A Modem Introduction to Its Foundations Sadri Hassani	Yes
Recommended Texts	Mathematics for Physics A guided tour for graduate students Michael Stone and Paul Goldbart	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

Module Information

معلومات المادة الدراسية

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

Module Level	UGIV	**Semester of Delivery**	1
Administering Department	3	**College**	8
Module Leader	Ahmad Hashim Abood	**e-mail**	prof.dr.ahmad@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**	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	PHY1102	**Semester**	1
Co-requisites module	PHY1103	**Semester**	2

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	1) To understand the concepts of Electrostatics and their applications. 2) To apply vector calculus to understand the behavior of static electric fields in standard configurations. 3) To use their ability to manage the electromagnetic laws to, in simple situations, set up a

	computational model and perform the necessary calculations: select appropriate methods; make appropriate approximations; plausibility assesses the results. 4) To analyze how energy is stored and transported in an electrostatics field.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1) Know the Vectors Algebra 2) Distinguish the scalar and vector quantities 3) Identify scalar and vector field 4) Define dot, vector and triple product 5) Formulate the relation between coordinate systems 6) solve Vectors Algebra problems 7) Describe the principle of the electrostatic fields 8) Understand, Coulomb's Law and Electrical Field Intensity. 9) Discuss the application of Gauss's Law and Maxwell's First Equation. 10) Recognize the Energy, Potential Difference and Potential. 11) Formulate the potential of electric dipole 12) Solve the problems of field, potential and potential difference 13) Compare between electric work and potential
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Vector Algebra**- Scalars and Vectors, Unit Vector, Vector Addition and Subtraction, Position and Distance Vector. Vector Multiplication, Dot Product, Cross Product, Scalar Triple Product and Vector Triple Product, Components of a vector (Projection of a Vector). Coordinate Systems and Transformation, Cartesian Coordinates, Circular Cylindrical Coordinates, Spherical Coordinates, Differential Volume Elements. Vector Transformation between Cartesian to Cylindrical, Vector Transformations between Cartesian to Spherical, Vector Transformation between Cylindrical to Spherical, Constant Coordinate Surfaces. **Electrostatic Fields**- Coulomb's Law, Electrical Field Intensity. Electric Fields due to Continues Charge Distributions, Line Charge. Field of a Sheet of Charge, Field of Volume Charge Distribution), Differential Length, Area and Volume. Electric Flux Density, Gauss's Law. Application of Gauss's Law For Symmetrical Charge Distributions, Point Charge, Line Charge Distribution, Coaxial Cable, Infinite Sheet of Charge Distribution, Uniform Spherical Volume Charge Distribution. Application of Gauss's Law: Differential Volume Element, Divergence, Maxwell's First Equation, Vector Operation Del and Divergence Theorem. **Energy and Potential**- Energy Expended in Moving a Point Charge in an Electric Field, Line Integral, Definition of Potential Difference and Potential, Potential Field of a Point Charge, Potential Field of a System of Charges and Conservative Property. Potential Gradient, Electric Dipole, Energy Density in Electrostatic fields.

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem)	64	**Structured SWL (h/w)**	4.27

الحمل الدراسي المنتظم للطالب خلال الفصل		الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	61	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.06
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation

تقييم المادة الدراسية

As		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10(10%)	3,8	1-5, 8-13
	Assignments	1	10(10%)		6,12
	Projects / Lab.				
	Report				
Summative assessment	Midterm Exam	1	20(20%)		1-8
	Final Exam	1	60(60%)		1-13
Total assessment			100(100%)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Vector Algebra, Scalars and Vectors, Unit Vector, Vector Addition and Subtraction, Position and Distance Vectors.
Week 2	Vector Algebra, Scalars and Vectors, Unit Vector, Vector Addition and Subtraction, Position and Distance Vectors.
Week 3	Coordinate Systems and Transformation, Cartesian Coordinates, Circular Cylindrical Coordinates, Spherical Coordinates, Differential Volume Elements.
Week 4	Vector Transformation between Cartesian to Cylindrical, Vector Transformations between Cartesian to Spherical, Vector Transformation between Cylindrical to Spherical, Constant Coordinate Surfaces,

Week 5	Electrostatic Fields, Coulomb's Law, Electrical Field Intensity.
Week 6	Electric Fields due to Continues Charge Distributions, Line Charge. Field of a Sheet of Charge, Field of Volume Charge Distribution), Differential Length, Area and Volume.
Week 7	Electric Flux Density, Gauss's Law. Application of Gauss's Law For Symmetrical Charge Distributions
Week 8	Point Charge, Line Charge Distribution, Coaxial Cable, Infinite Sheet of Charge Distribution, Uniform Spherical Volume Charge Distribution.
Week 9	Application of Gauss's Law: Differential Volume Element, Divergence
Week 10	Maxwell's First Equation, Vector Operation Del and Divergence Theorem
Week 11	Energy and Potential, Energy Expended in Moving a Point Charge in an Electric Field, Line Integral
Week 12	Definition of Potential Difference and Potential, Potential Field of a Point Charge
Week 13	Potential Field of a System of Charges and Conservative Property.
Week 14	Potential Gradient, Electric Dipole
Week 15	Energy Density in Electrostatic fields
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

Week	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- Mathihew N. O. Sadiku, "Elements of Electromagnetics" , 6th Edition, OXFORD UNIVERSITY PRESS, 2015. 2- William H. Hayt, Jr. . John A. Buck," Engineering Electromagnetics", 8th Edition, The McGraw Companies, 2012. 3- Joseph A. Edminister, Mahmood Nahvi, " Electromagnetics", 4th Edition, McGraw-Hill Education, 2014.	Online
Recommended Texts	1- Mathihew N. O. Sadiku, "Elements of Electromagnetics" , 6th Edition, OXFORD UNIVERSITY PRESS, 2015. 2- William H. Hayt, Jr. . John A. Buck," Engineering Electromagnetics", 6th Edition, The McGraw Companies, 2001.	Online
Websites		

Grading Scheme

مخطط الدرجات

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

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

Module Information

معلومات المادة الدراسية

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

Module Level	UGIV	**Semester of Delivery**	2
Administering Department	3	**College**	8
Module Leader	Ahmad Hashim Abood	**e-mail**	prof.dr.ahmad@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**	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	PHY1105	**Semester**	1
Co-requisites module	PHY1106	**Semester**	2

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	1) To understand the Laplace and Poisson equations 2) To understand the effect of materials on electric and magnetic fields. 3) To understand the Bio-Savart and Ampere Law and line integral 4) To identify the curl and stock theorem 5) Use their conceptual understanding of the electromagnetic laws in order to qualitatively describe the behavior of the solution to the problem. 6) Use their ability to manage the electromagnetic laws to, in simple situations, set up a computational model and perform the necessary calculations: select appropriate methods; make appropriate approximations; plausibility assess the results analyze how energy is stored and transported in an electromagnetic field. 7) Describe and analyze electromagnetic wave propagation in free-space. 8) To understand principles of propagation of uniform plane waves. 9) To understand the pointing vector
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1) Identify the Laplace's and Poisson's Equations and their applications. 2) Recognized between Laplace's and Poisson's Equations 3) Derive the Biot-Savart law for different current distribution 4) Discussed the ampere circuital law 5) Describe and understand the principle of Ampere's circuit Law-Maxwell's Equation 6) An ability to distinguish, identify, define, formulate, and solve Magnetic Scalar and Vector Potentials, Derivation of Boit-Savart's Law and Ampere's Law 7) Describe the plane wave

	8) To explain the concepts of Electromagnetic Fields, waves, wave propagation and wave polarization. 9) To understand the relations between the fields under time varying situations.
Indicative Contents المحتويات الإرشادية	**Laplace's** & **Poisson's Equation**, Explicit Form of Laplace's Equation, Curl of a Vector, Stokes Theorems. **Magnetostatic Fields- Biot-Savart Law**, Induction of Magnetic Field , Magnetic Field intensity. Ampere's circuit Law-Maxwell's Equation, Application of Ampere's law (Infinite Line Current, Infinite Sheet Current, Infinitely Long Coaxial Transmission Line). **Magnetic Flux Density-Maxwell's Equation**, Curl of a Vector and Stokes's Theorem, Potential Gradient. Magnetic Scalar and Vector Potentials, Derivation of Boit-Savart's Law and Ampere's Law. **Time varying fields and Maxwell's Equations:** Faraday's law, Displacement current, Gauss's law, Ampere's law, Poynting theorem **The Uniform Plan Wave**: E and H field in free space, Plan wave propagation in dielectric, propagation in lossy dielectric and good dielectric, wave polarization

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple class works 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	64	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.27
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	61	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.06
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation

تقييم المادة الدراسية

As		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10(10%)	2,8	2-3,6-8
	Assignments	2	10(10%)	5,10	9,12
	Projects / Lab.				
	Report				
Summative assessment	**Midterm Exam**	1	20(20%)	1-10	2-8
	Final Exam	1	40(40%)	All	All
Total assessment			100(100%)		

elivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered

Week 1	Induction of Magnetic Field , Magnetic Field intensity.
Week 2	Magneto-static Fields, Biot-Savart Law
Week 3	Magnetic Flux Density-Maxwell's Equation
Week 4	Curl of a Vector and Stokes' Theorem, Potential Gradient.
Week 5	Ampere's circuit Law-Maxwell's Equation
Week 6	Application of Ampere's law
Week 7	Magnetic Scalar and Vector Potentials
Week 8	Derivation of Boit-Savart's Law and Ampere's Law.
Week 9	Maxwell's Equations, Faraday's Law, Gauss's law and Ampere's law
Week 10	Uniform plan wave, E and H field in free space
Week 11	E and H field in dielectric
Week 12	E and H field in lossy dielectric
Week 13	E and H field in good dielectric
Week 14	Pointing theorem
Week 15	Wave polarization
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

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