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

Academic Program and Course Description Guide

2024

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 / University of Wasit

College / Institute / College of Science

Scientific Department / Department of Physics

Name of Academic or Professional Program

Bachelor's of Science Degree (General Physics / Medical Physics)

Name of Final Degree / (Bachelor's of Science in General Physics and Bachelor's of Science in Medical Physics)

Semesters /Academic System: Bologna, Grade1 and Grade 2.

Date of Preparation: 1/8/ 2024

Date of File Completion: September 1 /9/ 2024

File verified by:

Quality Assurance and University Performance Department

Director of Quality Assurance and University Performance Department: Asst. Prof. Dr. Hussain Taqi John

Assist Prof
Dr. Faik Jameel Hassan Mayah
Dean

Dean's approval: Prof. Dr. Faik Gamil Hassan

Date: 1 / 9 / 2024 Signature:

1. Program Vision

Leadership in physics and medical physics sciences and its applications at the local and international levels, effective participation with community institutions and seeking to upgrade the department to ensure its suitability to international standards in the field of physics and its applications to meet the needs of the labor market, and excellence in preparing qualified national competencies scientifically and research, which makes it distinguished at the level of physics departments in local, regional and international universities.

2. Program Mission

Creativity and excellence in higher education and scientific research in the disciplines of physics and medical physics, qualifying specialized cadres scientifically and professionally in the field of physics, securing the appropriate educational and academic environment to provide them with the necessary expertise and skills to provide society with specialized competencies in physics and in the field of education and scientific research, as well as developing their scientific capabilities and using them in life phenomena, analyzing them and finding appropriate scientific solutions to them by providing distinguished educational programs that comply with quality standards and meet the requirements of the labor market.

3. Program Objectives

1. The Department of Physics pays great attention to topics that serve the scientific march of the country with all its needs from the various fields of knowledge in the fields of theoretical and practical physics and medical physics.
2. Qualifying specialized scientific and professional competencies to contribute to conducting distinguished scientific and applied research.

3. Providing studies and research related to physics that meet the needs and requirements of institutions and bodies spread throughout the country, and upgrading the level of graduates by achieving comprehensive quality standards through the preparation of advanced and renewable educational programs that qualify graduates to keep pace with the requirements of the knowledge society and the labor market.

4. The department also meets the need of students to continue their postgraduate studies and provide optimal work in the fields of science and practical application by paying attention to the scientific ability of the teaching staff, developing their scientific, technical and administrative abilities, and upgrading scientific research to contribute to conducting distinguished scientific and applied research.

5. Establishing research centers and exchanging scientific experiences and competencies with research centers in prestigious Arab and international universities.

4. Program Accreditation

Does the program have program accreditation? And from which agency?

NO.

5. Other external influences

Weak infrastructure in the labor market.

6. Program Structure

Program Structure	Number of Courses	Credit hours	Percentage	Reviews*
Institution Requirements	–	–	–	–
College Requirements	4	24	–	–
Department	34	180	%50	Basic

Requirements				
Summer Training	**2**	**4**	**%50**	**basic**
Other				

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

7. Expected learning outcomes of the program	
Knowledge	
Learning Outcomes 1	Learning Outcomes Statement 1
Skills	
Learning Outcomes 2	Learning Outcomes Statement 2
Learning Outcomes 3	Learning Outcomes Statement 3
Ethics	
Learning Outcomes 4	Learning Outcomes Statement 4
Learning Outcomes 5	Learning Outcomes Statement 5

8. Teaching and Learning Strategies
Teaching and learning strategies and methods adopted in the implementation of the program in general.

9. Evaluation methods
Implemented at all stages of the program in general.

10. Faculty						
Faculty Members						
Academic Rank	**Specialization**		**Special Requirements/Skills (if applicable)**		**Number of the teaching staff**	
	General	**Special**			**Staff**	**Lecturer**
Prof. Abbas Fadel Issa	**Physics Sciences**	**Physics of Materials**			**Yes**	
Prof. Ahmed Khudair Abbas	**Physics Sciences**	**Plasma Physics**			**Yes**	
Prof. Hadi Dowaij Zarzour	**Physics Sciences**	**Nuclear physics**			**Yes**	

Prof. Dr. Mounir Hillel Jadua	**Physics Sciences**	**Semiconductor**			**Yes**	
Prof. Hashem Ali Yusr	**Physics Sciences**	**Physics of Materials**			**Yes**	
Prof. Najwa Jassim Jubair	**Physics Sciences**	**Physics of Materials**			**Yes**	
Mr. Mohammed Jabr Rasan	**Physics Sciences**	**Nuclear physics**			**Yes**	
Assoc. Prof. Dr. Motasem Ibrahim Malak	**Physics Sciences**	**Remote sensing and image processing**			**Yes**	
Assoc. Prof. Ali Kamel Mohsen	**Physics Sciences**	**Laser Physics**			**Yes**	
Prof. Khudair Abbas Assaf	**Physics Sciences**	**Astrophysics**			**Yes**	
Assoc. Prof. Mahdi Ahmed Mohamed	**Physics Sciences**	**Physics of Nanomaterials**			**Yes**	
Assoc. Prof. Faeq Jamil Hassan	**mathematics**	**Mathematical analysis**			**Yes**	
Assoc. Prof. Hanan Abd Ali Thajeel	**Physics Sciences**	**Laser physics and electro-optics**			**Yes**	
Assoc. Prof. Dr. Ahmed Jadah Farhan	**Physics Sciences**	**Physics of Materials**			**Yes**	
Assoc. Prof. Dr. Hussein Taqi John	**Physics Sciences**	**General Physics**			**Yes**	
Assoc. Prof. Muhannad Ali Hussein Zughayer	**Physics Sciences**	**Physics/Electronics**			**Yes**	
Assoc. Prof. Ghada Iyad Kazem	**Physics Sciences**	**Thin Film Physics**			**Yes**	
Prof. Maytham Salman Amana	**Physics Sciences**	**Environmental Physics**			**Yes**	
Mr. Ali Jabbar Freih	**Physics Sciences**	**Physics of Materials**			**Yes**	
. Saba Farhan Hathott	**Physics Sciences**	**Physics of materials**			**Yes**	
Dr. Firas Mohammed Dashur	**Physics Sciences**	**Nanotechnology**			**Yes**	
Dr. Uday Jawad Kazem	**Physics Sciences**	**Nanotechnology**			**Yes**	

Dr. Idan Assi Abdullah	**Physics Sciences**	**Electro-optics**			**Yes**	
Dr. Zeina Abbas Salman	**Physics Sciences**	**Biophysics**			**Yes**	
Dr. Sattar Hussein Swailem	**Physics Sciences**	**Laser physics**			**Yes**	
Dr. Muhannad Abdul karim Saadoun	**Physics Sciences**	**Renewable energies**			**Yes**	
Dr. Ahmed Abdul Mahdi Abdul Karim	**engineering**	**Control Calculators**			**Yes**	
Dr. Nadia Naima Zahir	**Physics Sciences**	**General Physics**			**Yes**	
Dr. Ali Karim Abboud	**Physics Sciences**	**General Physics**			**Yes**	
Dr. Shaima Hussein Shahd	**Physics Sciences**	**Remote sensitization**			**Yes**	
. Najla Jarjak Abdullah	**Physics Sciences**	**General Physics**			**Yes**	
Dr. Manal Jabbar Khalifa	**Physics Sciences**	**Electro-optical physics**			**Yes**	
Dr. Hassanein Rahim Abd	**Physics Sciences**	**Nanophysics**			**Yes**	
Dr. Shaima Saadoun Hashem	**Physics Sciences**	**Theoretical and molecular physics**			**Yes**	
Wassan Ali Hussein	**Physics Sciences**	**Theoretical and molecular physics**			**Yes**	
. Zainab Ali Harbi	**Physics Sciences**	**General Physics**			**Yes**	
Emad Kamel Zayer	**Physics Sciences**	**Astrophysics**			**Yes**	
Huda Mousa Mutlaq	**Physics Sciences**	**General Physics**			**Yes**	
Hussein Mahdi Ahmed	**engineering**	**Mechanical Engineering**			**Yes**	
Ola Abdullah Manati	**Physics Sciences**	**General Physics**			**Yes**	
Nagham Abdel Amir Yasser	**Physics Sciences**	**General Physics**			**Yes**	
. Haider Majed Tohme	**Physics Sciences**	**General Physics**			**Yes**	

Roaa Hilal Hassani	**Physics Sciences**	**General Physics**			**Yes**	
Mohamed Juma Tohme	**Physics Sciences**	**Thin films**			**Yes**	
Salman Rasul Salman	**Physics Sciences**	**General Physics**			**Yes**	
Adai Radad Hussain	**Physics Sciences**	**physics**			**Yes**	
. Ahmed Abdul Kazem Thamer	**Physics Sciences**	**General Physics**			**Yes**	
Fatima Fadel Abbas	**Physics Sciences**	**physics**			**Yes**	
. Kholoud Daham Khamkhakh	**Physics Sciences**	**General Physics**			**Yes**	
Russell Saeed Radi	**Physics Sciences**	**Nanophysics**			**Yes**	
Zahraa Razzaq inside Hussein	**Physics Sciences**	**General Physics**			**Yes**	
Zainab Karim Latif	**Physics Sciences**	**General Physics**			**Yes**	
Muhammad Jaber Muhammad	**Physics Sciences**	**Physics**			**Yes**	
Noor Hussein Majeed	**Physics Sciences**	**Solid State Physics and Materials**			**Yes**	
Saif Jawad Kazem Obaid	**Physics Sciences**	**Physics**			**Yes**	
Reyam Abdul hussain Nouri Radi	**Physics Sciences**	**General Physics**			**Yes**	
Alaa Latif Shather	**Physics Sciences**	**Physics Science**			**Yes**	
Sajad Falih Hussein	**Computer Science**	**Computer Science**			**Yes**	
Inas Allawi Razzaq	**Physics Science**	**Physics Science**			**Yes**	
Ali Kazem Plough	**accounting**	**International budgets**			**Yes**	
Amer Shamil Abdul rahman Hussein	**Applied**	**mathematics**			**Yes**	

Prof. Jaafar Abbas Al-Mamouri	Biology Science	Physiology				yes
Raghda Saad Jamil	Biology Science	Biotechnology				yes
Zahraa Ali Tahir	Chemistry Science	Biochemistry				yes
Noor Al , Huda Sabah Hussein	Chemistry Science	Biochemistry				yes
Russell Abd El , Reda Issa	Biology Science	animal				yes
Jana Razak Abd	law	law				yes
Muthanna Naima						yes
Ahmed Abd El , Hamid	Arabic	Arabic				yes
Wasan Raad Salloum Jawad		Banking & Finance				yes
Hussein Abd El , Ilah Yassin	Physics Science	General Physics				yes
Ansam Majed Hassan	law	law				yes
Farqad Faisal Idan	Physics Science	General Physics			yes	

Professional Development

Mentoring new faculty members

Directing new faculty members to the need to work on developing the scientific method, methods of delivering scientific lectures, and how to deliver scientific material to the student.

Professional development of faculty members

Work on finding development ideas and work on developing scientific laboratories and the scientific aspect, as the students' specialization is a scientific specialization.

11. Acceptance Criterion

Students who graduate from the preparatory school, the scientific branch, are allowed to be admitted to the College of Science, Department of Physics, after passing the preparatory stage and passing it with a rate of 70 or more for admission.

12. The most important sources of information about the program

1. Books prescribed by the Ministry of Higher Education and Scientific Research.
2. External scientific sources.
3. Use libraries and the Internet..

13. Program Development Plan

The department has a lot of methodological and research plans for the development of the department, where the department presidency, the department council and the scientific committee are working to provide all the requirements for the development of the department.

Program skills chart																			
Please check the boxes corresponding to the individual learning outcomes from the program subject to evaluation																			
Learning outcomes required from the programme																			
General and qualifying transferable skills (other skills related to employability and personal development)				**Emotional and value goals**				**Subject-specific skill objectives**				**Cognitive objectives**				**Basic Or optional**	**Course Name**	**Course Code**	**Year/level**
D4	**D3**	**D2**	**D1**	**C4**	**C3**	**C2**	**C1**	**B4**	**B3**	**B2**	**B1**	**A4**	**A3**	**A2**	**1A**				
+	+	+	+	+	+		+	+		+	+	+	+	+	+	Basic	**Mechanics and properties of matter (P1+P2)**		**the first**
+	+		+	+	+	+	+	+	+	+	+	+	+	+	+	Basic	**Electric and magnetic (P1+P2)**		
+	+	+	+	+	+	+	+	+	+		+				+	Basic	**Mathematics (P1+P2)**		
	+		+		+		+	+	+	+	+	+	+	+		Basic	**Computers (F1+F2)**		

	+		+	+		+	+		+	+	+	+	+	+	+	Basic	**Astronomy (V2)**		
	+		+	+		+	+		+	+	+	+	+	+	+	Basic	**Arabic language (P1+P2)**		
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	Basic	**English language (P2)**		
		+	+	+	+		+	+		+	+			+	+	Basic	**Human Rights and Democracy (P1)**		
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	Basic	**Modern Physics (P1+P2)**		**the second**
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	Basic	**Thermal physics and thermodynamics (F1+F2)**		
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	Basic	**Analytical Mechanics (P1+P2)**		
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	Basic	**Analogue Electronics (P1)**		
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	Basic	**Digital (F1)**		
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	Basic	**Computers**		

																(F1+F2)		
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	Basic	**Mathematics (P1+P2)**		
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	Basic	**Sound and wave motion (P2)**		
+	+	+	+	+	+	+	+	+	+	+	+		+	+	Basic	**English Language (P1)**		
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	Basic	**Optics (P1+P2)**		**Third - General Physics Branch**
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	Basic	**Digital (F1+F2)**		
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	Basic	**Laser (F1+F2)**		
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	Basic	**Quantum Mechanics (P1+P2)**		
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	Basic	**Modeling (F1+F2)**		
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	Basic	**English language (P2)**		
	+	+	+	+		+	+		+	+		+	+		+	My test	**Semiconductors (P1)**	
																My test	**Nano Physics (P2)**	
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	My test	**Environment and Pollution (P1)**		

+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	My test	**Solar energy (P2)**		
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	Basic	**Health Physics (P1)**		**Third - Medical Physics Branch**
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	Basic	**Biochemistry (P1)**		
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	Basic	**General Biology (P1)**		
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	Basic	**Optics and Laser (P1)**		
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	Basic	**Nuclear and radiation physics (P1)**		
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	Basic	**Physics of Living Systems (P1)**		
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	**My test**	**Life statistics (P1+P2)**		
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	Basic	**English Language (P1)**		
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	Basic	**Life Physics (P2)**		
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	Basic	**Cell Biology (P2)**		
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	Basic	**Atomic and molecular spectra (F2)**		

+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	Basic	**Waves and ultrasound (P2)**		
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	Basic	**Bioelectronics (P2)**		
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	Basic	**Computer and Image Modeling (P2)**		
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	Basic	**Nuclear Physics (P1+P2)**		**Fourth - General Physics Branch**
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	Basic	**Physics of Solids (P1+P2)**		
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	Basic	**Electromagnetic theory)F1+F2(**		
+		+	+		+	+	+		+	+	+				+	Basic	**Philosophy of science and the logic of scientific research (P1+P2)**	
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	**Basic**	**Research project**	
+	+		+	+			+		+	+	+	+		+	+	My test	**Mathematical Physics (P1+P2)**	
+		+	+		+		+	+		+	+		+	+	+	My test	**Elementary particles (F1 + F2)**	

+	+			+		+	+	+			+	+	+		+	My test	**Thin films (F1+F2)**		
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	Basic	**Mathematical methods for medical physics (P1)**		**Fourth - Medical Physics Branch**
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	Basic	**Neurophysics (P1)**		
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	Basic	**Physics of radiation therapy)F1(**		
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	Basic	**Heart Physics (P1)**		
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	Basic	**Medical devices (P1)**		
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	Basic	**Magnetic resonance imaging and hysteresis (F1)**		
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	**My test**	**Sensing Physics (P1)**		
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	Basic	**English Language (P1)**		
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	Basic	**Spectroscopic and nuclear analysis (P2)**		
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	Basic	**Medical materials (P2)**		

+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	Basic	**Drug Transport Physics (P2)**		
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	Basic	**Medical Statistics (P2)**		
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	Basic	**Medical laser applications (P2)**		
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	Basic	**Medical Nanoscience (P2)**		
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	**Basic**	**Research project**		

The general third stage

Theoretical

Course Description Form

1. Course Name:	**Nanophysics**
2. Course Code:	
PHY−417	
3. Semester / Year:	
Second semester / 2025−2024 /3rd stage	
4. Description Preparation Date:	
15−9−2024	
5. Available Attendance Forms:	
Attendance in class	
6. Number of Credit Hours (Total) / Number of Units (Total)	
2 / 2/ 2 TOTAL	
7. Course administrator's name (mention all, if more than one name)	
Name: Asst. Prof. Dr. Mahdi Ahmed Mohammed Email: mahmed@uowasit.edu.iq	
8. Course Objectives	
Course Objectives	• **Identify the nano phenomenon in relation to the dimensions of materials and time** • **Know nanomaterial approaches** • **To have acknowledge about the physical properties of nanoscale materials** • **Identify its most important applications**
9. Teaching and Learning Strategies	
Strategy	**1− Enable the student to know the basics of nanophysics** **2− Knowing the difference in the physical properties of nanomaterials from bulk material** **3− Enabling the student about nanomaterial approaches** **4− How to use mathematical equations to calculate the physical parameters of nanomaterial** **5− Knowing the importance of using nanomaterials in various applications**

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Study introduction of nanophysics and classification of nanomaterials	Introduction for Nanophysics	Lecture + discussion	Tests
2	2	Studying the effect of nanoscale on surface area and quantum effect	Significance of nanoscale: Surface Effects Quantum Effects	Lecture + discussion	Tests
3	2	Study the optical properties of materials that have a surface Plasmon resonances phenomenon	Properties of Nanomaterials 1- Optical Properties: a- Surface Plasmons	Lecture + discussion	Tests
4	2	Study the optical properties of materials that under effect of quantum confinement	b-Quantum confinement effect	Lecture + discussion	Tests
5	2	Study the heating effect on the melting point of nanoparticles	2-Thermodynamic properties	Lecture + discussion	Tests
6	2	Study the magnetic properties of bulk materials	Magnetic Properties P.1	Lecture + discussion	Tests
7	2	Study the magnetic properties of nanomaterials	Magnetic Properties P.2	Lecture + discussion	Tests
8	2	Study the mechanical properties of different shapes of nanomaterials	Mechanical Properties	Lecture + discussion	Tests
9	2	Study the electrical properties of nanomaterials	Electrical Properties	Lecture + discussion	Tests
10	2	Learning synthesis nanomaterials using physical methods	Synthesis types of nanomaterials: Physical synthesis	Lecture + discussion	Tests
11	2	Learning synthesis nanomaterials using chemical and biological methods	Chemical and biological syntheses	Lecture + discussion	Tests
12	2	Knowing some applications of nanomaterials	Applications of nanomaterials	Lecture + discussion	Tests

11. Course Evaluation

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

Monthly exams	daily and oral exams	project or report	final exam
30	5	5	60

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	
Main references (sources)	1-Nanomaterials and Nanochemistry (C. Brechignac P. Houdy M. Lahmani) 2-Nanostructured Materials and Their Applications (Stergios Logothetidis)

	3-Nanophysics and Nanotechnology (Edward L. Wolf) 4-Nanotechnology Understanding Small Systems, 3rd Ed (Rogers Jesse Adams Sumita Pennathur)
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	Internet sites in general specialized in teaching a explaining nanophysics

Course Description Form

1. Course Name **:Laser1**	
2. Course Code 3. PHY-322	
4. Semester / Year	
Firsit Semester(2025−2024) /3rd stage	
5. Description Preparation Date:	
15−9−2024	
6. Available Attendance Forms	
Actual Attendance	
7. Number of Credit Hours (Total) / Number of Units (Total)	
(2 Theory)/ 2/ 3 TOTAL	
8. Course administrator's name (mention all, if more than one name)	
Name: **Email: @uowasit.edu.iq**	
9. Course Objectives	
Course Objectives	**1- Preparing students scientifically, professionally, and culturally, and enabling them to know scientific facts, concepts, and theories regarding laser physics and its applications.** **2- Enabling students to apply scientific and practical methods in addressing life and professional**

	problems and situations **3- Enabling the graduate to continue his postgraduate studies and absorb new developments and developments in the field of laser physics and its applications.** **4- Preparing students scientifically, professionally, and culturally, and enabling them to know scientific facts, concepts, and theories.** **5- Enabling students to apply scientific methods in addressing life and professional problems and situations** **6- Developing and developing ethical trends and values related to scientific research** **7- Enabling students to acquire basic skills related to scientific research and work in the public and private sectors** **8-As well as the cognitive objectives, introducing students to general laser concepts and basics and their applications** **9- Adopting systematic thinking methods that are compatible with the form and content of available knowledge** **10- Employing cognitive and practical skills and applying them in a way that suits the work need and according to the specialty** **11- Adopting in-depth learning methods that ensure understanding and application** **12- Providing learners with continuous feedback on the acquired knowledge** **13- Acquiring self-regulated learning strategies that are consistent with perceived self-efficacy.**
10.	Teaching and Learning Strategies
Strategy	**Activating teaching methods that constantly develop the learner's personali and reduce dependence on the teaching staff** **Activating teaching methods based on e-learning and adopting data shows a the smart board** **- Realistic and conceptual learning with healthy meaning** **- Using common teaching methods such as lectures, live questioning, proble**

	solving and discussion

11. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	(2 **Th)**	Referred to in the previous axis, each according to the content	**An introductory introduction to lasers**	**Deliverance - discussion**	**Written tests**
2	(2 **Th)**	Referred to in the previous axis, each according to the content	Laser idea and pumping schemes	**Deliverance – discussion**	**Written tests**
3	(2 **Th)**	Referred to in the previous axis, each according to the content	Radiation interaction with matter	**Deliverance – discussion**	**Written tests**
4	(2 **Th)**	Referred to in the previous axis, each according to the content	Automatic and motivated emission	**Deliverance - discussion**	**Written tests**
5	(2 **Th)**	Referred to in the previous axis, each according to the content	Partial system and systems	**Deliverance – discussion**	**Written tests**
6	(2 **Th)**	Referred to in the previous axis, each according to the content	Displayed levels	**Deliverance – discussion**	**Written tests**
7	(2 **Th)**	Referred to in the previous axis, each according to the content	Pumping into the laser system	**Deliverance – discussion**	**Written tests**
8	(2 **Th)**	Referred to in the previous axis, each according to the content	Optical and electrical pumping	**Deliverance – discussion**	**Written tests**
9	(2 **Th)**	Referred to in the previous axis, each according to the content	Resonant optical cavities	**Deliverance – discussion**	**Written tests**
10	(2 **Th)**	Referred to in the previous axis, each according to the content	Stable and unstable resonant cavities	**Deliverance – discussion**	**Written tests**
11	(2 **Th)**	Referred to in the previous axis, each according to the content	Continuous wave and transient behavior of lasers	**Deliverance – discussion**	**Written tests**

12	(2 **Th)**	Referred to in the previous axis, each according to the content	Triple and quad level lasers	**Deliverance – discussion**	**Written tests**
13	(2 **Th)**	Referred to in the previous axis, each according to the content	Change the quality factor	**Deliverance – discussion**	**Written tests**
14	(2 **Th)**	Referred to in the previous axis, each according to the content	Ways to install the pattern	**Deliverance - discussion**	**Written tests**
15	(2 **Th)**	Referred to in the previous axis, each according to the content	**Laser operating methods**	**Deliverance - discussion**	**Written tests**
16					

12. Course Evaluation

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

Course	Daily preparation, daily and oral exams	Daily assignments	reports	Seminars	Mid-term Exam	Final - Exam
2nd	**15**	**15**	**5**	**5**	**10**	**50**

13. Learning and Teaching Resources

Required textbooks (curricular books, if any)	- Principles of Lasers" 5th ed. by Ora Svelto, 2010 Springer New York Dordrec Heidelberg London. .
Main references (sources)	Laser Fundamentals, William T. Silfvast
Recommended books and references (scientific journals, reports…)	**"1-Laser fundamentals" 2nd ed. by William t. Silfvast. 2004, Cambridge University Press.** **"2-Laser Beams: Theory, Properties and Applications" by Editors, Maxim Thys and Eugene Desmet. 2009, Nova Science Publishers, Inc. New York..**
Electronic References, Websites	https://www.hazemsakeek.net/ https://www.googlescholar

Course Description Form

1. Course Name **Laser2**
2. Course Code 3. PHY-322
4. Semester / Year
Second Semester(2025−2024)
5. Description Preparation Date:
15−9−2024
6. Available Attendance Forms
Actual Attendance
7. Number of Credit Hours (Total) / Number of Units (Total)
(2 Theory)/2/3
8. Course administrator's name (mention all, if more than one name)
Name: **Email: @uowasit.edu.iq**
9. Course Objectives

Course Objectives	**1- Preparing students scientifically, professionally, and culturally, and enabling them to know scientific facts, concepts, and theories regarding laser physics and its applications.** **2- Enabling students to apply scientific and practical methods in addressing life and professional problems and situations** **3- Enabling the graduate to continue his postgraduate studies and absorb new developments and developments in the field of laser physics and its applications.** **4- Preparing students scientifically, professionally, and culturally, and enabling them to know scientific facts, concepts, and theories.** **5- Enabling students to apply scientific methods in**

	addressing life and professional problems and situations **6- Developing and developing ethical trends and values related to scientific research** **7- Enabling students to acquire basic skills related to scientific research and work in the public and private sectors** **8-As well as the cognitive objectives, introducing students to general laser concepts and basics and their applications** **9- Adopting systematic thinking methods that are compatible with the form and content of available knowledge** **10- Employing cognitive and practical skills and applying them in a way that suits the work need and according to the specialty** **11- Adopting in-depth learning methods that ensure understanding and application** **12- Providing learners with continuous feedback on the acquired knowledge** **13- Acquiring self-regulated learning strategies that are consistent with perceived self-efficacy.**

10. Teaching and Learning Strategies

Strategy	**Activating teaching methods that constantly develop the learner's personali and reduce dependence on the teaching staff** **Activating teaching methods based on e-learning and adopting data shows a the smart board** **- Realistic and conceptual learning with healthy meaning** **- Using common teaching methods such as lectures, live questioning, proble solving and discussion**

11. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	(2 **Th)**	Referred to in the previous axis, each according to the content	**Types of lasers, solid lasers**	**Deliverance - discussion**	**Written tests**
2	(2 **Th)**	Referred to in the	Gas, neutral, atomic and	**Deliverance – discussion**	**Written tests**

		previous axis, each according to the content	molecular lasers		
3	(2 **Th)**	Referred to in the previous axis, each according to the content	Liquid and chemical lasers	**Deliverance – discussion**	**Written tests**
4	(2 **Th)**	Referred to in the previous axis, each according to the content	Semiconductor lasers	**Deliverance - discussion**	**Written tests**
5	(2 **Th)**	Referred to in the previous axis, each according to the content	Free electron laser	**Deliverance – discussion**	**Written tests**
6	(2 **Th)**	Referred to in the previous axis, each according to the content	Characteristics of laser beams	**Deliverance – discussion**	**Written tests**
7	(2 **Th)**	Referred to in the previous axis, each according to the content	Temporal and spatial distortion	**Deliverance – discussion**	**Written tests**
8	(2 **Th)**	Referred to in the previous axis, each according to the content	Directivity and laser speckle	**Deliverance – discussion**	**Written tests**
9	(2 **Th)**	Referred to in the previous axis, each according to the content	Brightness and higher order similarity	**Deliverance – discussion**	**Written tests**
10	(2 **Th)**	Referred to in the previous axis, each according to the content	Transformation of laser beam	**Deliverance – discussion**	**Written tests**
11	(2 **Th)**	Referred to in the previous axis, each according to the content	Laser amplification	**Deliverance – discussion**	**Written tests**
12	(2 **Th)**	Referred to in the previous axis, each according to the content	Laser applications	**Deliverance – discussion**	**Written tests**
13	(2 **Th)**	Referred to in the previous axis, each according to the content	Uses of lasers and optical communications	**Deliverance – discussion**	**Written tests**
14	(2 **Th)**	Referred to in the previous axis, each	Holography	**Deliverance - discussion**	**Written tests**

		according to the content			
15	(2 Th)	Referred to in the previous axis, each according to the content	**Military applications**	**Deliverance - discussion**	**Written tests**
16					

12. Course Evaluation

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

Course	Daily preparation, daily and oral exams	Daily assignments	reports	Seminars	Mid-term Exam	Final - Exam
2nd	**15**	**15**	**5**	**5**	**10**	**50**

13. Learning and Teaching Resources

Required textbooks (curricular books, if any)	- Principles of Lasers" 5th ed. by Ora: Svelto, 2010 Springer New York Dordrec Heidelberg London. .
Main references (sources)	Laser Fundamentals, William T. Silfvast
Recommended books and references (scientific journals, reports…)	**"1-Laser fundamentals" 2nd ed. by William t. Silfvast. 2004, Cambridge University Press.** **"2-Laser Beams: Theory, Properties and Applications" by Editors, Maxim Thys and Eugene Desmet. 2009, Nova Science Publishers, Inc. New York..**
Electronic References, Websites	https://www.hazemsakeek.net/ https://www.googlescholar

Course Description Form

1. Course Name : **Digital Electronic1**	
2. Course Code PHY-322	
3. Semester / Year	
First Semester(2024−2025)	
4. Description Preparation Date:	
15−9−2024	
5. Available Attendance Forms	
Actual Attendance	
6. Number of Credit Hours (Total) / Number of Units (Total)	
(2 Theory)(2 hours practical)/ 3 TOTAL	
7. Course administrator's name (mention all, if more than one name)	
Name: D.r Ahmed Abdel Mahdi Abdel Karim **Email: @uowasit.edu.iq**	
8. Course Objectives	
Course Objectives	**1- Preparing students scientifically, professionally and culturally, and enabling them to know the facts** **2- Enabling students to apply scientific and practical conversations to new problems and life situations** **3-Enabling the graduate to continue moving forward with his experiences and developments in the field of physical sciences** **4-Developing animal trends and values related to scientific research** **5- Enabling students to acquire basic skills related to scientific research in the**

	Japanese public sector **6-One of the tourism goals is also to introduce students to general optical and laser concepts and basics and their applications** **7- Adopting the systematic design of music and available knowledge content** **8- Employing tourism and practical skills in nature** **9- Adopting design as a learning component that ensures understanding and application** **10- Providing learners with continuous nutrition without knowledge** **11- Acquiring the ability to learn independently and thus increasing perceived self-efficacy** **12- Helping students acquire beneficial principles and values, including harmony with Arab-Islamic authenticity and other popular religions.** **13- Developing students' attitudes, inclinations, and abilities to face current and future challenges** **14-Developing animal trends and values related to scientific research** **15- Enabling students to acquire basic skills related to scientific research in the Japanese public sector** **16- Providing learners with knowledge of the principles of digital electronics** **17- Developing positive attitudes towards digital electronics** **18-Learning about research methods in digital electronic science** **19- Identify the basic concepts in digital electronics** **20- Identify the basic trends in the study of digital electronic devices**

	21- Identify the goals of digital electronics **22- Forming learners' knowledge of the difference between digital electronics and analogue electronics** **23- Identify the basic features and characteristics of digital electronics** **24-Learning about digital organizations** **25-Acquiring theoretical knowledge of the dual system** **26-Acquiring theoretical knowledge of logic gates** **27- Study the performance and characteristics of logic gates** **28- Acquire logic circuit design skills**

9. Teaching and Learning Strategies

Strategy	Group discussions and assignments Creating an atmosphere of competition among students and treatin individual differences using appropriate educational methods Research groups - nested discussion circles. - Teaching methods include the use of educational technology - Encouraging students to self-learn.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	(2 **Th)**	Referred to in the previous axis, each according to the content	**Introduction to digital electronic and numbering systems**	**Deliverance - discussion**	**Written tests**
2	(2 **Th)**	Referred to in the previous axis, each according to the content	The conversion between the numbering systems	**Deliverance - discussion**	**Written tests**
3	(2 **Th)**	Referred to in the previous axis, each according to the content	Decision making elements"NOT, AND, OR Gates"	**Deliverance - discussion**	**Written tests**
4	(2 **Th)**	Referred to in the previous axis, each according to the content	Logic Families"NAND, NOR, XOR, XNOR Gates"	**Deliverance - discussion**	**Written tests**

5	(2 **Th)**	Referred to in the previous axis, each according to the content	How to derive Boolean expression from Truth Table	**Deliverance - discussion**	**Written tests**
6	(2 **Th)**	Referred to in the previous axis, each according to the content	Simplify Boolean expressions by DeMorgan's theorems	**Deliverance - discussion**	**Written tests**
7	(2 **Th)**	Referred to in the previous axis, each according to the content	Introduction to Arithmetic circuits	**Deliverance - discussion**	**Written tests**
8	(2 **Th)**	Referred to in the previous axis, each according to the content	First exam		**Written tests**
9	(2 **Th)**	Referred to in the previous axis, each according to the content	Digital additions	**Deliverance - discussion**	**Written tests**
10	(2 **Th)**	Referred to in the previous axis, each according to the content	Examples Half and Full Adder	**Deliverance - discussion**	**Written tests**
11	(2 **Th)**	Referred to in the previous axis, each according to the content	Design Binary adder circuit	**Deliverance - discussion**	**Written tests**
12	(2 **Th)**	Referred to in the previous axis, each according to the content	Digital subtractor, Half and Full subtractors	**Deliverance - discussion**	**Written tests**
13	(2 **Th)**	Referred to in the previous axis, each according to the content	Design Binary subtractors	**Deliverance - discussion**	Written tests
14	(2 **Th)**	Referred to in the previous axis, each according to the content	Introduction to the Karnuph-Map	**Deliverance - discussion**	Written tests
15	(2 **h)**	Referred to in the previous axis, each according to the content	**Examples about Karnuph-Map**	**Deliverance - discussion**	**Written tests**
16	(2h)	Referred to in the previous axis, each according to the content	**Second Exam**		Written tests

11. Course Evaluation

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

Course	Daily preparation, daily and oral exams	Daily assignments	reports	Seminars	Mid-term Exam	Final -Exa
2nd	15	15	5	5	10	50

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Digital Fundamentals by Floyd
Main references (sources)	Laser Fundamentals , William T. Silfvast
Recommended books and references (scientific journals, reports…)	وهو برنامج محاكاة (Multisin)استخدام برنامج ملتي زم خاص لبناء واختبار الدوائر الرقمية والتماثلية
Electronic References, Websites	

Course Description Form

1. Course Name : **Digital Electronic2**
2. Course Code 3. PHY-325
4. Semester / Year
second Semester(2024−2025)
5. Description Preparation Date:
15−9−2024
6. Available Attendance Forms
Actual Attendance
7. Number of Credit Hours (Total) / Number of Units (Total)
(2 Theory)(2 hours practical)/ 3
8. Course administrator's name (mention all, if more than one name)
Name: D.r Ahmed Abdel Mahdi Abdel Karim **Email: @uowasit.edu.iq**
9. Course Objectives

Course Objectives	**1- Preparing students scientifically, professionally and culturally, and enabling them to know the facts** **2- Enabling students to apply scientific and practical conversations to new problems and life situations** **3-Enabling the graduate to continue moving forward with his experiences and developments in the field of physical sciences** **4-Developing animal trends and values related to scientific research** **5- Enabling students to acquire basic skills related to scientific research in the Japanese public sector** **6-One of the tourism goals is also to introduce students to general optical and laser concepts and basics and their applications** **7- Adopting the systematic design of music and available knowledge content** **8- Employing tourism and practical skills in nature** **9- Adopting design as a learning component that ensures understanding and application** **10- Providing learners with continuous**

	nutrition without knowledge **11- Acquiring the ability to learn independently and thus increasing perceived self-efficacy** **12- Helping students acquire beneficial principles and values, including harmony with Arab-Islamic authenticity and other popular religions.** **13- Developing students' attitudes, inclinations, and abilities to face current and future challenges** **14-Developing animal trends and values related to scientific research** **15- Enabling students to acquire basic skills related to scientific research in the Japanese public sector** **16- Providing learners with knowledge of the principles of digital electronics** **17- Developing positive attitudes towards digital electronics** **18-Learning about research methods in digital electronic science** **19- Identify the basic concepts in digital electronics** **20- Identify the basic trends in the study of digital electronic devices** **21- Identify the goals of digital electronics** **22- Forming learners' knowledge of the difference between digital electronics and analogue electronics** **23- Identify the basic features and characteristics of digital electronics** **24-Learning about digital organizations** **25-Acquiring theoretical knowledge of the dual system** **26-Acquiring theoretical knowledge of logic gates** **27- Study the performance and characteristics of logic gates** **28- Acquire logic circuit design skills**

10. Teaching and Learning Strategies

Strategy	Group discussions and assignments Creating an atmosphere of competition among students and treatin individual differences using appropriate educational methods Research groups - nested discussion circles. - Teaching methods include the use of educational technology - Encouraging students to self-learn.

11. Course Structure

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

1	(2 **Th)**	Referred to in the previous axis, each according to the content	**Digital Devices: Design Decoder with examples**	**Deliverance - discussion**	**Written tests**
2	(2 **Th)**	Referred to in the previous axis, each according to the content	Digital Devices: Design Encoder with examples	**Deliverance - discussion**	**Written tests**
3	(2 **Th)**	Referred to in the previous axis, each according to the content	Digital Devices: Design Multiplexer with examples	**Deliverance - discussion**	**Written tests**
4	(2 **Th)**	Referred to in the previous axis, each according to the content	Digital Devices: Design Demultiplexer with examples	**Deliverance - discussion**	**Written tests**
5	(2 **Th)**	Referred to in the previous axis, each according to the content	Memory Elements: S-R Latch, S-R Flip Flops	**Deliverance - discussion**	**Written tests**
6	(2 **Th)**	Referred to in the previous axis, each according to the content	Memory Elements: J-K Flip Flops, D Flip Flops	**Deliverance - discussion**	**Written tests**
7	(2 **Th)**	Referred to in the previous axis, each according to the content	Memory Elements: T Flip Flops with design Examples	**Deliverance - discussion**	**Written tests**
8	(2 **Th)**	Referred to in the previous axis, each according to the content	First exam		**Written tests**
9	(2 **Th)**	Referred to in the previous axis, each according to the content	Applications of Flip Flop: Frequency division and data parallel storage	**Deliverance - discussion**	**Written tests**
10	(2 **Th)**	Referred to in the previous axis, each according to the content	Applications of Flip Flop: Asynchronous Binary Counters	**Deliverance - discussion**	**Written tests**
11	(2 **Th)**	Referred to in the previous axis, each according to the content	Applications of Flip Flop: Synchronous Binary Counters	**Deliverance - discussion**	**Written tests**
12	(2 **Th)**	Referred to in the previous axis, each according to the content	Applications of Flip Flop: Shift Registers(SISO, SIPO)	**Deliverance - discussion**	**Written tests**
13	(2 **Th)**	Referred to in the	Applications of Flip	**Deliverance -**	Written

		previous axis, each according to the content	Flop: Shift Registers(PISO, PIPO)	**discussion**	tests
14	(2 **Th)**	Referred to in the previous axis, each according to the content	Extra examples about applications of Flip Flops	**Deliverance - discussion**	Written tests
15	(2 **h)**	Referred to in the previous axis, each according to the content	**General review**	**Deliverance - discussion**	**Written tests**
16	(2h)	Referred to in the previous axis, each according to the content	**Second Exam**		Written tests

12. Course Evaluation

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

Course	Daily preparation, daily and oral exams	Daily assignments	reports	Seminars	Mid-term Exam	Final - Exam
2nd	**15**	**15**	**5**	**5**	**10**	**50**

13. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Digital Fundamentals by Floyd
Main references (sources)	Laser Fundamentals , William T. Silfvast
Recommended books and references (scientific journals, reports…)	وهو برنامج محاكاة (Multisin)استخدام برنامج ملتي زم خاص لبناء واختبار الدوائر الرقمية والتماثلية
Electronic References, Websites	

Course Description Form

1. Course Name
Quantum mechanics1
2. Course Code
PHY-314
3. Semester / Year
First Semester(2025-2024)
4. Description Preparation Date:
15-9-2024
5. Available Attendance Forms
Actual Attendance
6. Number of Credit Hours (Total) / Number of Units (Total)
(2 Theory+1 Tutorial) /3
7. Course administrator's name (mention all, if more than one name)
Name: Prof.Dr. Hadi Dwaich ALattabi **Email: alattabih@uowasit.edu.iq**
8. Course Objectives

Course Objectives	**1.The goals of studying quantum mechanics in physics express the real behavior in the study of physical systems in the microscopic state, such as the atom, the nucleus, and elementary particles.** **2. It also gives the student understanding and awareness and expands science fiction and philosophy in the field of physics.** **3. Through it, the student can compare the results of quantum and classical mechanics.** **4. The student develops in the field of mathematics because mathematics is considered the language of physics and quantum mechanics.**

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9. Teaching and Learning Strategies

Strategy	**-Group discussions and assignments** **-Creating an atmosphere of competition among students and treating individual differences using appropriate educational methods.** **-Research groups - nested discussion circles.** **- Teaching methods include the use of educational technology.** **- Encouraging students to self-learn.**

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	(2 Th+1 Tu)		Elementary characteristics of quantum mechanics and the importance of quantum mechanics in physics	Theoretical	Daily preparation, daily and oral exams on the board and assignments
2	(2 Th+1 Tu)		Vector function and its interpretation	Theoretical	Daily preparation, daily and oral exams on the board and assignments
3	(2 Th+1 Tu)		Derivation of Schödinger equation	Theoretical	Daily preparation, daily and oral exams on the board and assignments
4	(2 Th+1 Tu)		Schödinger vector equation - effects	Theoretical	Daily preparation, daily and oral exams on the board and assignments
5	(2 Th+1 Tu)		Schödinger vector equation - effects	Theoretical	Daily preparation, daily and oral exams on the board and assignments
6	(2 Th+1 Tu)		Derivation of the vector equation for the hydrogen atom	Theoretical	Daily preparation, daily and oral exams on the board and assignments
7	(2 Th+1 Tu)		Deduce the Laplacian effects that affect a proton and an electron	Theoretical	Daily preparation, daily and oral exams on the board and assignments
8	(2 Th+1 Tu)		Mid-term Exam		written exams
9	(2 Th+1 Tu)		Standard functions	Theoretical	Daily preparation, daily and oral exams on the board and assignments
10	(2 Th+1 Tu)		Eigenvalues and eigenfunctions of position and momentum in the x-axis direction	Theoretical	Daily preparation, daily and oral exams on the board and assignments
11	(2 Th+1 Tu)		Eigenvalues and eigenfunctions of position and momentum in the x-axis direction	Theoretical	Daily preparation, daily and oral exams on the board and assignments
12	(2 Th+1 Tu)		Expected values	Theoretical	Daily preparation, daily and oral exams on the board and assignments

13	**(2 Th+1 Tu)**		**Disparity**	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
14	**(2 Th+1 Tu)**		**Eigen functions and constants of motion**	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
15	**(3 h)**		**Results in quantum mechanics that correspond to fundamental results in classical mechanics**	**Theoretical**	**reports**
16	**(3 h)**		**Results in quantum mechanics that correspond to fundamental results in classical mechanics**	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**

11. Course Evaluation

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

Course	Daily preparation, daily and oral exams	Daily assignments	reports	Seminars	Mid-term Exam	Final -Exam
1st	**15**	**15**	**5**	**5**	**10**	**50**

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	
Main references (sources)	Quantum Mechanics, written by Dr. Jassim Muhammad Al-Husseini and others (1980) - College of Science - University of Baghdad
Electronic References,	Websites

Course Description Form

1. Course Name
Quantum mechanics2
2. Course Code
PHY−323
3. Semester / Year
Second Semester(2024/2025)
4. Description Preparation Date:
15−9−2024
5. Available Attendance Forms
Actual Attendance
6. Number of Credit Hours (Total) / Number of Units (Total)
(2 Theory+1 Tutorial) /3
7. Course administrator's name (mention all, if more than one name)
Name: Prof.Dr. Hadi Dwaich ALattabi **Email: alattabih@uowasit.edu.iq**
8. Course Objectives

Course Objectives	**1.The goals of studying quantum mechanics in physics express the real behavior in the study of physical systems in the microscopic state, such as the atom, the nucleus, and elementary particles.** **2. It also gives the student understanding and awareness and expands science fiction and philosophy in the field of physics.** **3. Through it, the student can compare the results of quantum and classical mechanics.** **4. The student develops in the field of mathematics because mathematics is considered the language of physics and quantum mechanics.** **.**

9. Teaching and Learning Strategies

Strategy	**-Group discussions and assignments** **-Creating an atmosphere of competition among students and treating individual differences using appropriate educational methods.** **-Research groups - nested discussion circles.** **- Teaching methods include the use of educational technology.** **- Encouraging students to self-learn.**

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	(2 Th+1 Tu)		**Results in quantum mechanics that correspond to fundamental results in classical mechanics**	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
2	(2 Th+1 Tu)		Solution of the time-dependent Schödinger equation	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
3	(2 Th+1 Tu)		**Complement of the time-dependent Schödinger equation**	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
4	(2 Th+1 Tu)		**Characteristics of energy levels and vector functions**	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
5	(2 Th+1 Tu)		**Dissolution**	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
6	(2 Th+1 Tu)		**Results implied by the time-independent Schödinger equation**	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
7	(2 Th+1 Tu)		**Results implied by the time-independent Schödinger equation**	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
8	(2 Th+1 Tu)		Mid-term Exam		**written exams**
9	(2 Th+1 Tu)		**Mathematical expression and features of the Kroenker function**	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
10	(2 Th+1 Tu)		**Representing a vector function with an expansion**	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
11	(2 Th+1 Tu)		**Effects properties**	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**

12	**(2 Th+1 Tu)**		**Substituting effect**	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
13	**(2 Th+1 Tu)**		**The expected value per unit of time depends on the effect of studying the change in the value replaced**	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
14	**(2 Th+1 Tu)**		**Low probability**	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
15	**(3 h)**		**Probability stream and quantized states**	**Theoretical**	**reports**
16	**(3 h)**		**Symmetry in quantum mechanics**	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**

11. Course Evaluation

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

Course	Daily preparation, daily and oral exams	Daily assignments	reports	Seminars	Mid-term Exam	Final -Exam
2nd	**15**	**15**	**5**	**5**	**10**	**50**

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	
Main references (sources)	Quantum Mechanics, written by Dr. Jassim Muhammad Al-Husseini and others (1980) - College of Science - University of Baghdad
Electronic References,	Websites

Course Description Form

1. Course Name
Solar energy
2. Course Code
PHY-327
3. Semester / Year
Second Semester(2024-2025)
4. Description Preparation Date:
15-9-2024
5. Available Attendance Forms
Actual Attendance
6. Number of Credit Hours (Total) / Number of Units (Total)
(2 Theory+1 Tutorial)/ 3
7. Course administrator's name (mention all, if more than one name)
Name: Prof.Dr. Najwa Jassim Jubier **Email: njassim@uowasit.edu.iq**
8. Course Objectives

Course Objectives	**1. Introduce students to solar energy stations** **2. Define principles of solar collectors** **3. Study heating and cooling systems** **4. Study types of photo voltics (PV)** **5. Study the economics aspects of solar systems and solar collectors** **6. Enable students to know types of thermal insulations**

9. Teaching and Learning Strategies	
Strategy	**Develop the students self-learning** **Enable students of studying efficiency of solar collectors**

	Enable students of calculating the feasibility of solar applications

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	(2 Th+1 Tu)		Introduction of renewable energies	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
2	(2 Th+1 Tu)		Solar energy collectors	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
3	(2 Th+1 Tu)		Performance of solar collectors	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
4	(2 Th+1 Tu)		Solar water heating system	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
5	(2 Th+1 Tu)		Solar space heating	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
6	(2 Th+1 Tu)		Cooling systems	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
7	(2 Th+1 Tu)		Photovoltaic systems	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
8	(2 Th+1 Tu)		Solar thermal power		**written exams**
9	(2 Th+1 Tu)		Exam	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
10	(2 Th+1 Tu)		Solar thermal power systems	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
11	(2 Th+1 Tu)		System Designing	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
12	(2 Th+1 Tu)		Insulations	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
13	(2 Th+1 Tu)		Solar economic analysis	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
14	(2 Th+1 Tu)		Heat transfer		**Daily preparation, daily and oral exams on the board and assignments**
15	(3 h)		Summative exam	**review**	**reports**

11. Course Evaluation

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

Course	Daily preparation, daily and oral exams	Daily assignments	reports	Seminars	Mid-term Exam	Final -Exam
2nd	**5**	**5**	**5**	**5**	**20**	**40**

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	
Main references (sources)	
Recommended books and references (scientific journals, reports…)	**1. Solar Energy Engineering** 2. **Photovoltaic Solar Energy Systems - The Solar Resource**

Course Description Form

1. Course Name:
Practical Mathematic
2. Course Code: 3. SCI-105
4. Semester / Year:
2024/2025
5. Description Preparation Date:
15-9-2024
6. Available Attendance Forms:
presence
7. Number of Credit Hours (Total) / Number of Units (Total)
Two theoretical hours, Two practical hours, and (3 Units)
8. Course administrator's name (mention all, if more than one name)
Name: Mutasim Ibrahim Malik Email: mutasim@uowasit.edu.iq
9. Course Objectives

Course Objectives	**. Preparing students scientifically, professionall facts, concepts and theories.** *** Enabling students to apply scientific methods situations.** *** Enabling the graduate to continue his higher s the field of physics Sciences.** *** Helping students to acquire useful trends and principles of the Islamic religion and other hea**

	* Developing the trends and inclinations of stud future challenges. * Development and development of ethical

10. Teaching and Learning Strategies

Strategy	* Students should be able to adopt scientific thinking methods in the face of problems * Adoption of systematic methods of thinking in harmony with the form and content of available knowledge * Employ cognitive skills in nature * Adopting in-depth learning methods that guarantee understanding and application * Provide learners with

11. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name
			Mathematical functions **1-D, 2-D, 3-D,Functions**
			Statistical concept **Mean, variance, median** **Chi-square** **AAE,ASE,RMSE**
			Probability distribution **Bionomial distribution** **Exponential distribution** **Poisson distribution**
			Fourier Modeling
			1-D Fourier transformation **2-D Fourier transformation**
			1D,2D Convolution
			Optical modeling **Aperture modeling**
			Point spread function **Modulation transfer function**
			Diffraction patterns
			Single slit **Double slit** **Multi slits**
			applications

			Lens design-design requirements-lens optimization-thin film
			Optical testing
			Optical astronomy
			Introduction to image processing
			Digital image ,type of image
			Image algebra, image filtering, Image translation , scaling, shifting, types of hist
			FFt for digital image

12. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, d reports .... etc

13. Learning and Teaching Resources

Required textbooks (curricular books, if any)	**-physical modeling in matlab** **By Allen Downey – green tea press, 2008**
Main references (sources)	**Physical Modeling** by Allen Downey
Recommended books and references (scientific journals, reports…)	**Publisher**: Green **ISBN/ASIN**: 0615185509 **ISBN-13**: 9780615185507 **Number of pages**: 155
Electronic References, Websites	www.mathworks.com

Course Description Form

1. Course Name	
Material Physics I	
2. Course Code	
PHY−113	
3. Semester / Year	
First Semester(2024−2025)	
4. Description Preparation Date	
15−9−2024	
5. Available Attendance Forms	
Actual Attendance	
6. Number of Credit Hours (Total) / Number of Units (Total)	
(2 Theory+2 Practical) /2	
7. Course administrator's name (mention all, if more than one name)	
Name: Prof.Dr. Najwa Jassim Jubier **Email: njassim@uowasit.edu.iq**	
8. Course Objectives	
Course Objectives	**To provide learners with knowledge of the principles of materials physics, develop positive attitudes and learn about basic concepts, as it focuses on studying and understanding the physical, chemical, mechanical and structural properties of different materials with the aim of developing new materials and improving the properties of existing materials to meet advanced industrial and technical needs. Materials science integrates physics, chemistry and engineering to study the relationship between the internal structure of materials, their properties and performance.**
9. Teaching and Learning Strategies	
Strategy	**Creating a competitive atmosphere among students and addressing individual differences using appropriate educational tools and paying attention to feedback to enhance understanding. It is also important to enhance learners' self-confidence to avoid fear of failure, and to apply active learning strategies to stimulate participation and interaction. Group discussions and solving assignments**

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

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	(2 Th+2 Pr.)	Understand the basic principles materials physics and their importance in studying properties of materials.	Introduction about material physics	Presence	Daily and oral exams and assignments Monthly exams for theoretical subjects Reports and daily and monthly exams for practical subjects
2	(2 Th+2 Pr.)	Identify the differences betw crystalline and amorphous materials in terms of structure and ato composition. Understand the concept of the crystal lattice and its differ models such as Bravais Lattices.	Crystal structure(crystalline and amorphous material) the crystalline of solids Baravais lattice and crystal translation vectors elements of crystal structure	Presence	
3	(2 Th+2 Pr.)	Identify and understand linear, two-dimensional, and three-dimensional crystal systems and lattices, the nature of the periodic arrangement of atoms within solids, and the types characterization of the cubic system.	Two and three dimensional lattices, type of cubic and volume of cubic	Presence	
4	(2 Th+2 Pr.)	Learn about the face indices of cubic system and how to find distance between the crystal planes.	Indices of the faces	Presence	
5	(2 Th+2 Pr.)	Learn how to represent directions crystals as well as surfaces using Mi indices and learn how to calculate angle between two crystal planes as as between two directions within crystal using their Miller indices.	Miller indices of direction and the angle between two planes and two directions	Presence	
6	(2 Th+2 Pr.)	Finding the density and atomic pack factor of cubic latticeS	Density and packing factor	Presence	
7	(2h.)		Exam 1		
8	(2 Th+2 Pr.)	Understanding closed-pac structures, including the hexago how to draw it, determine its surfa and find its volume and atomic pack factor.	Close packed structures, hexagonal close packed structures	Presence	
9	(2 Th+2 Pr.)	Learn about the concept of diffraction in crystals and how to us to analyze the structure of materi And learn about the types of rays u in crystal diffraction experiments.	Crystal diffraction, the incident beam used for crystal diffraction, X-rays, neutron, electron.	Presence	
10	(2 Th+2 Pr.)	Learn about Bragg's law wl describes the relationship between	Bragg law,	Presence	

		ray diffraction and crystal planes crystals and fully understand mathematical relationship in Bra law that links the diffraction angle the wavelength of X-rays (λ), and distance between crystal planes (d).	**determination of X-ray wave length, and inter atomic distance**		
11	**(2 Th+2 Pr.)**	**Learn about the concept of reciprocal lattice as a mathematical that helps analyze diffrac phenomena in crystals. Understand difference between a crystal lattice a reciprocal lattice and how to use reciprocal lattice to represent physical properties of mater Understand the concept of the Brillo zone as a region in the reciprocal lat used to analyze materials' electr properties. Learn how to draw Brillo zones for different crystals and them to study the interaction betw electrons and X-rays.**	**Reciprocal lattice concept ,Reciprocal lattice vectors Diffraction Conditions Brillouin zones and Bragg law**	Presence	
12	**(2 h.)**		**Exam2**	Presence	
13	**(2 Th+2 Pr.)**	**Learn and understand how to find volumes of primitive lattices reciprocal space.**	**Reciprocal Lattice to S.C Lattice Reciprocal Lattice to bcc Lattice Reciprocal Lattice to fcc Lattice**	Presence	
14	**(2 Th+2 Pr.)**	**Identify the different types of cry bonds that bind atoms or ions wi crystals.**	**Crystal binding (the vender walls bond, ionic crystals covalent crystal, metal crystal, Hydrogen bonded crystal**	Presence	
15	**(2 Th+2 Pr.)**		**Review**	**Review**	
16	**(2 Th+2 Pr.)**		**The preparatory week before the Final Exam**		

11. Course Evaluation

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

Course	daily exams	Daily assignments	Exam1	Exam2	Practical	Final - Exam
1st	4	4	10	10	12	60

12. Learning and Teaching Resources

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

Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

Course Description Form

1. Course Name	
Material Physics II	
2. Course Code	
PHY-314	
3. Semester / Year	
First Semester(2024-2025)	
4. Description Preparation Date	
15-9-2024	
5. Available Attendance Forms	
Actual Attendance	
6. Number of Credit Hours (Total) / Number of Units (Total)	
(2 Theory+2 Practical)/ 2	
7. Course administrator's name (mention all, if more than one name)	
Name: Prof.Dr. Najwa Jassim Jubier **Email: njassim@uowasit.edu.iq**	
8. Course Objectives	
Course Objectives	**Providing learners with knowledge of the principles of materials physics, developing positive attitudes, and identifying the thermal properties of materials, phases, entropy, enthalpy, cooling curves, nucleation and mechanical properties, the behavior of materials when subjected to loads, and the tests that can be performed on materials.**
9. Teaching and Learning Strategies	
Strategy	**Creating a competitive atmosphere among students and addressing individual differences using appropriate educational tools and paying attention to feedba to enhance understanding. It is also important to enhance learners' self-confidence to avoid fear of failure, and to apply active learning strategies to stimulate participation and interaction.** **Group discussions and solving assignments** **Research groups - overlapping discussion circles.**

	Including teaching methods using educational technology **Encouraging students to learn independently.**

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	(2 **Th+2 Pr.**)	**Introduction and ionic cohesive energy**	**Introduction to familiarize students with the second .semester curriculum**	Presence	**Daily and oral exams and assignments** **Monthly exams for theoretical subjects** **Reports and daily and monthly exams for practical subjects**
2	(2 **Th+2 Pr.**)	**ionic cohesive energy and Phase equilibrium diagrams**	**Address the force that holds atoms together and analyze the relationship between cohesive energy and material properties such as hardness and melting point, and explain the behavior of materials based on that energy and calculate the Modeling constant. Understand the basics of diagrams such as the relationship between temperature, pressure, and composition of matter.**	Presence	
3	(2 **Th+2 Pr.**)	**Cooling curves, Eutectic systems**	**Understanding phase equilibrium diagrams, eutectic systems, cooling curves, how to apply Gibbs equation, solid solutions and their types.**	Presence	
4	(2 **Th+2 Pr.**)	**Rate process and crystallization ,kinetics of phase transformation, nucleation and growth,**	**Includes understanding of the rate of crystallization, transformation kinetics, and the concept of nucleation and growth.**	Presence	
5	(2 **Th+2 Pr.**)	**nucleation kinetics, Heterogeneous nucleation**	**It includes understanding and discussing the free energy equation, types of nucleation, and understanding the difference between homogeneous nucleation and heterogeneous**	Presence	

			nucleation.		
6	(2 Th+2 Pr.)	Nucleation Rate, The growth.	Understand the relationship between crystallization rate and temperature, surface free energy, and critical nucleus size.	Presence	
7	(2h.)	Exam 1	Exam 1		
8	(2 Th+2 Pr.)	Plotting stress -strain diagram	Introduction to mechanical properties, drawing a strain-stress curve, and the relationship of properties to the stractural of the material	Presence	
9	(2 Th+2 Pr.)	physical properties of materials(mechanical properties, true stress-strain curve, shear stress and strain, poisons ratio, fatigue and fracture,	Identify all mechanical properties of materials including shear stress and strain, Poisson's ratio, Young's modulus and fracture.	Presence	
10	(2 Th+2 Pr.)	Electrical properties, electron mobility, in metals. conductivity, mobility,	Comprehensive understanding of electrical properties Including conductivity and mobility of metal	Presence	
11	(2 Th+2 Pr.)	Work function and electron emission photoemission, semiconductors).	Identification of semiconductors as materials with a small energy gap between the conduction band and the valence band and understanding the role of the work function in semiconductors and its relationship to conduction properties.	Presence	
12	(2 h.)	Exam2	Exam2	Presence	
13	(2 Th+2 Pr.)	Experimental techniques for material analysis, DTA, DSC DMS	Knowledge of materials testing techniques including thermal analysis	Presence	
14	(2 Th+2 Pr.)	EDS ,electron microscope , AFM ,SEM	Learn about EDS as a tool for analyzing the chemical elements in materials	Presence	

			based on measuring the energy emitted by X-rays after excitation of the material Learn about AFM as a tool for examining surfaces at the atomic level using a microprobe and Learn how to use SEM to analyze surfaces and reveal fine details using bounced or emitted electrons.		
15	(2 **Th+2 Pr.)**	**Review**	**Review**	**Review**	
16	(2 **Th+2 Pr.)**		**The preparatory week before the Final Exam**		

11. Course Evaluation

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

Course	daily exams	Daily assignments	Exam1	Exam2	Practical	Final - Exam
2nd	**4**	**4**	**10**	**10**	**12**	**60**

12. Learning and Teaching Resources

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

Course Description Form - Spectra - 2 / Third Year Physics - General

1. Course Name:
Spectra
2. Course Code: /
PHY-326
3. Semester / Year:
2024-2025 – 2ND Semester
4. Description Preparation Date:
15-9-2024
5. Available Attendance Forms:
two hours per week
6. Number of Credit Hours (Total) / Number of Units (Total)
2hours (15 weeks in the second course)/2
7. Course administrator's name (mention all, if more than one name)
Name: Teacher: Dr. Ali Karim Abboud **Email:** ahatab@uowasit.edu.iq

8. Course Objectives

Course Objectiv	• Provide learners with knowledge Atomic Spectra • Develop positive attitudes toward Atomic Spectra • Identify research methodologies in Atomic Spectra • Recognize basic concepts in Atomic Spectra • Identify basic trends in Atomic Spectra • Recognize the objectives of atomic spectra • Form learners' knowledge of the historical development of Atomic Spectra • Identify the components of the basic properties of Atomic Spectra • Recognize basic information about atomic models • Acquire theoretical knowledge in continuous and line spectra • Identify absorption spectra and emission spectra • Evaluate the performance characteristics of continuous X-ray spectra • Acquire skills related to atomic and molecular spectroscopy instruments

9. Teaching and Learning Strategies

Strategy	

10. 9. Course Structure:

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	**Knowledge of** Modern	Atomic Models	**Method of Lecture,**	**QUIZ. and**

		atomic model theory	Modern Atomic Model Theory	**Atomic Models Modern Atomic Model Theory**	**EXAM**
2	**2**	**Knowledge of** Bohr's model and hydrogen atom	Bohr's model and hydrogen atom	**Method of Lecture, discussion and brainstorm**	**QUIZ. and EXAM**
3	**2**	**Knowledge of** Atomic transition series	Atomic transition series	**Method of Lecture, discussion and brainstorm**	**QUIZ. and EXAM**
4	**2**	**Knowledge of** Hydrogen atom spectrum	Hydrogen atom spectrum	**Method of Lecture, discussion and brainstorm**	**QUIZ. and EXAM**
5	**2**	**Knowledge of** Introduction to atomic and molecular spectra	Introduction to atomic and molecular spectra	**Method of Lecture, discussion and brainstorm**	**QUIZ. and EXAM**
6	**2**	**Knowledge of** Divisions and properties of the electromagnetic spectrum	Divisions and properties of the electromagnetic spectrum	**Method of Lecture, discussion and brainstorm**	**QUIZ. and EXAM**
7	**2**	**Knowledge of** Continuous spectrum and line spectrum	Continuous spectrum and line spectrum	**Method of Lecture, discussion and brainstorm**	**QUIZ. and EXAM**
8	**2**	**Knowledge of** Absorption spectrum and emission spectrum	Absorption spectrum and emission spectrum	**Method of Lecture, discussion and brainstorm**	**QUIZ. and EXAM**
9	**2**	**Knowledge of** Hydrogen atom spectrum and Rydberg constant	Hydrogen atom spectrum and Rydberg constant	**Method of Lecture, discussion and brainstorm**	**QUIZ. and EXAM**
10	**2**	**Knowledge of** Infrared spectrum	Infrared spectrum	**Method of Lecture, discussion and brainstorm**	**QUIZ. and EXAM**
11	**2**	**Knowledge of** Infrared absorption mechanism	Infrared absorption mechanism	**Method of Lecture, discussion and brainstorm**	**QUIZ. and EXAM**
12	**2**	**Knowledge of** X-ray spectrum	X-ray spectrum	**Method of Lecture, discussion and brainstorm**	**QUIZ. and EXAM**
13	**2**	**Knowledge of** Visible spectrum and ultraviolet spectrum	Visible spectrum and ultraviolet spectrum	**Method of Lecture, discussion and brainstorm**	**QUIZ. and EXAM**
14	**2**	**Knowledge of** Basic components of spectroscopic devices	Basic components of spectroscopic devices	**Method of Lecture, discussion and brainstorm**	**QUIZ. and EXAM**
15	**2**	**Knowledge of** Absorption devices, emission devices, and scattering measurement devices	Absorption devices, emission devices, and scattering measurement devices	**Method of Lecture, discussion and brainstorm**	**QUIZ. and EXAM**
16	**2**	**Exam**	**Exam**		

11.

1. **Follow up daily attendance.**
2. **Daily Quiz**

3. Monthly Exam 4. Final exam 5. grades for participation to solve questions during the lecture	
6. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	–Atomic Spectra and Atomic Structure by G. Herzberg, 1984.
Main references (sources)	
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

Practical

Course Description Form

1. Course Name: **Digital Electronics Lab.**

2. Course Code:

PHY−223

3. Semester / Year:

2024-2025

4. Description Preparation Date:

15−9−2024

5. Available Attendance Forms:

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

2/2 /2

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

Name: Dr. Manal Jabbar Khalifa
Email: mjabbar@uowasit.edu.iq

8. Course Objectives

Course Objectives	1- Teaching the student the skills of digital electronics and logical design in practice and linking it to the theoretical aspect. 2- Design and connect digital logic circuits, also design them by Multisim (simulation work). 3-Introducing the science of logical design of digital electronic circuits. 4- Qualifying students to work in vari private and governmental sectors.

9. Teaching and Learning Strategies

Strategy	1. Interactive lectures: Use lectures to present basic concepts related to digital electronic circuits, while encouraging students to ask questions. 2. Use of multimedia and technology 3. Evaluation and feedback: Continuous evaluation of students through tests, reports, and providing constructive feedback that helps improve the learning process. 4. Self-learning and research: Encouraging students to do self-research explore the latest developments in the field of electronics, which helps developing research skills and continuous learning.

10. Course Structure

Week	Ho	Required Learning	Unit or subject name	Learni	Evaluati

	urs	Outcomes		ng metho d	on method
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	1.Understanding the structure and operation of logic gates 2- Design digital circuits using logic gates and simulate the operation of digital circuits using the Multism program. 3-Applying theoretical material practically	Introduction to Digital Electronics Decision making elements (DME) Boolean Algebra De Morgan theorems XOR and XNOR gates Applications of XOR Binary Addition (Half Adder) Full Adder Exam Binary subtraction (Half subtractor) Full Subtractor Digital Comparison BCD code-to- Seven segments display Encoder and Decoder Review End of first semester exam Description of the simulation program and circuit connection (Multisim) MUX and DeMUX Flip Flops Types of Flip Flops(RS FF) Clocked RS F.F. D F.F and clocked D F.F JK F.F clocked JK F.F Exam Master Slave F.F T F.F Registers Counters Design Examples Review End of second semester exam	Interacti ve	Quiz, monthly written exam, Reports

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student :
Daily preparation 10
Reports 10
Monthly exam 40
Final exam 40

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	

Main references (sources)	**Basics of digital computers (Malvino)** **Digital Logic Fundamentals 9th edition (Thomas L. Floyd)**
Recommended books and references (scientific journals, reports…)	**Translator of basics of logic and computer design (Mono Morris)**
Electronic References, Websites	

Course Description Form

1. Course Name:
Optics Physics1 - Practical
2. Course Code:

PHY−321

3. Semester / Year:

First semester / 2025−2024

4. Description Preparation Date:

15−9−2024

5. Available Attendance Forms:

Attendance / Biannual

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

2 / 2/3

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

Name: - Dr. Edan Assi Abdallah
- Assist Prof. Ali Jabbar Fraih
Email: alialzubeidy@uowasit.edu.iq

8. Course Objectives

Course Objectives	• Enable the student to understand the practical application of theoretical foundations • The student's knowledge of comparing the results obtained practically with theoretical results • Analyze data and discuss results

9. Teaching and Learning Strategies

Strategy	• The ability to logically analyze experimental results • Ability to draw and discuss results

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Referred to in the previous axis, each according to the content	Study the characteristics of the image formed by a convex lens and find the focal length	Charting and practical calculations	Written tests
2	2	=	**Study the characteristics of the image formed by the concave mirror and find the focal length**	Charting and practical calculations	Written tests
3	2	=	**Using a moving microscope to measure**	Charting and practical	Written tests

			the refractive index of glass and water	calculations	
4	**2**	=	**Find the focal length of a concave lens using a convex lens**	Charting and practical calculations	Written tests
5	**2**	=	**Use the spectrometer to calculate the refractive index of a transparent material**	Charting and practical calculations	Written tests
6	**2**	=	**Mid-term exam**	Charting and practical calculations	Written tests
7	**2**	=	**A matrix system to study the characteristics of images formed by a convex lens and a concave mirror**	Charting and practical calculations	Written tests
8	**2**	=	**Using Lambert's law to measure the refractive index of a thin, transparent film**	Charting and practical calculations	Written tests
9	**2**	=	**Measure the optical energy gap and calculate the refractive index of a transparent material using a spectrophotometer**	Charting and practical calculations	Written tests
10	**2**	=	**Mid-term exam**	Charting and practical calculations	Written tests
11	**2**	=	**Review and audit**		

11. Course Evaluation

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

Monthly exams	daily and oral exams	project or report	Experimental exams	Final exam
6	2	4	12	60 (40 theoretical +20 experimental)

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	
Main references (sources)	فرانسيس أ. جنكيز ، ترجمة أ.د. عبد الفتاح أحمد الشاذلي ، د . سعيد

	بسيوني الجزيري ، أساسيات البصريات ، الدار الدولية للنشر – القاهرة ، الطبعة الاولى .
Recommended books and references (scientific journals, reports…)	Glenn Elert, "The Nature of Light", The Physics Hyper text book,. أيجن هيكن ، ترجمة د محمد عبد الحميد عثمان درويش ، د علي عبد الحميد عثمان درويش ، البصريات – سلسلة ملخصات شوم ، الدار الدولية للاستثمارات الثقافية – القاهرة ، الطبعة الاولى
Electronic References, Websites	

Course Description Form

1. Course Name:
Optics Physics2 - Practical
2. Course Code:

PHY−311

3. Semester / Year:

Second semester / 2025−2024

4. Description Preparation Date:

15−9−2024

5. Available Attendance Forms:

Attendance / Biannual

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

2 / 2/3

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

Name: - Dr. Edan Assi Abdallah
- Assist Prof. Ali Jabbar Fraih
Email: alialzubeidy@uowasit.edu.iq

8. Course Objectives

Course Objectives	• Enable the student to understand the practical application of theoretical foundations • The student's knowledge of comparing the results obtained practically with theoretical results • Analyze data and discuss results

9. Teaching and Learning Strategies

Strategy	• The ability to logically analyze experimental results • Ability to draw and discuss results

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Referred to in the previous axis, each according to the content	Optical activity and calculation of the specific rotation constant	Charting and practical calculations	Written tests
2	2	=	**Use the spectrometer to find the diffraction grating constant**	Charting and practical calculations	Written tests
3	2	=	**Find the dispersive and resolving power of the prism**	Charting and practical calculations	Written tests
4	2	=	**Using the spectrometer**	Charting and	Written tests

			to study the properties of the diffraction grating	practical calculations	
5	**2**	=	**Study the relationship between intensity and the radius of curvature of an optical fiber**	Charting and practical calculations	Written tests
6	**2**	=	**Mid-term exam**	Charting and practical calculations	Written tests
7	**2**	=	**Find the wavelength of sodium light using Young's double-slit**	Charting and practical calculations	Written tests
8	**2**	=	**Newton's rings**	Charting and practical calculations	Written tests
9	**2**	=	**Measure the Brewster angle and calculate the refractive index of a transparent material**	Charting and practical calculations	Written tests
10	**2**	=	**Mid-term exam**	Charting and practical calculations	Written tests
11	**2**	=	**Review and audit**		

11. Course Evaluation

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

Monthly exams	daily and oral exams	project or report	Experimental exams	Final exam
6	2	4	12	60 (40 theoretical +20 experimental)

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	
Main references (sources)	فرانسيس أ. جنكيز ، ترجمة أ.د. عبد الفتاح أحمد الشاذلي ، د . سعيد بسيوني الجزيري ، أساسيات البصريات ، الدار الدولية للنشر – القاهرة ، الطبعة الاولى .
Recommended books and references (scientific journals, reports…)	Glenn Elert, "The Nature of Light", The Physics Hyper text book,. أيجن هيكن ، ترجمة د محمد عبد الحميد عثمان درويش ، د علي عبد الحميد عثمان درويش ، البصريات – سلسلة ملخصات شوم ، الدار الدولية للاستثمارات الثقافية – القاهرة ، الطبعة الاولى

Electronic References, Websites	

Course Description Form

1. Course Name:
Practical laser physics1
2. Course Code:

PHY−321
3. Semester / Year:
First semester / 2025−2024/3rd stage/general
4. Description Preparation Date:
15−9−2024
5. Available Attendance Forms:
Attendance / Biannual
6. Number of Credit Hours (Total) / Number of Units (Total)
2 / 2 /3
7. Course administrator's name (mention all, if more than one name)
Name:

8. Course Objectives

Course Objectives	1 - Understand how lasers work, including the concepts of light stimulation and emission and the techniques used to generate lasers. 2- Understand the different types of lasers as well as the physical properties and unique applications of each type. 3- Highlighting safety standards when dealing with laser systems, including assessing risks, required preventive measures, and using protective glasses to ensure safe operation and protection of eyes and the environment.

9. Teaching and Learning Strategies

Strategy	1- Cooperative learning: This approach encourages students to work together in small groups to solve problems and achieve academic goals, which enhances interaction and exchange of ideas among students. 2- Experiential learning: This method includes the use of practical activities and practical experiments to enhance students' understanding and apply theoretical concepts in reality. 3- Active learning: This method involves students actively participating, which enhances the understanding and application of concepts.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Study of laser applications	Study of the Gaussian distribution of helium-neon laser intensity	Charting and practical calculations	Written tests
2	2	=	Calculate the radius of the laser spot	Charting and practical calculations	Written tests
3	2	=	Calculate the wavelength of laser light	Charting and	Written tests

				practical calculations	
4	2	=	Study of semiconductor laser polarization	Charting and practical calculations	Written tests
5	2	=	Application of Mals' law	Charting and practical calculations	Written tests
6	2	=	Study of laser light diffraction	Charting and practical calculations	Written tests
7	2	=	Calculate the radius of the wave front of laser light	Charting and practical calculations	Written tests
8	2	=	Study of interference and diffraction using lasers	Charting and practical calculations	Written tests

11. Course Evaluation

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

Monthly exams	daily and oral exams	project or report	Experimental exams	Final exam
6	2	4	12	60 (40 theoretical +20 experimental)

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	
Main references (sources)	Lasers, Fundamentals and Applications, K. Thyagarajan , Ajoy Ghatak, 2nd Edition, 2011
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

Course Description Form

1. Course Name:
Practical laser physics2
2. Course Code:

PHY−322

3. Semester / Year:

2nd semester / 2024−2025 /3rd stage/general

4. Description Preparation Date:

15−9−2024

5. Available Attendance Forms:

Attendance / Biannual

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

2 / 2/3

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

Name:

8. Course Objectives

Course Objectives	1 - Understand how lasers work, including the concepts of light stimulation and emission and the techniques used to generate lasers. 2- Understand the different types of lasers as well as the physical properties and unique applications of each type. 3- Highlighting safety standards when dealing with laser systems, including assessing risks, required preventive measures, and using protective glasses to ensure safe operation and protection of eyes and the environment.

9. Teaching and Learning Strategies

Strategy	1- Cooperative learning: This approach encourages students to work together in small groups to solve problems and achieve academic goals, which enhances interaction and exchange of ideas among students. 2- Experiential learning: This method includes the use of practical activities and practical experiments to enhance students' understanding and apply theoretical concepts in reality. 3- Active learning: This method involves students actively participating, which enhances the understanding and application of concepts.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Study of laser applications	Measuring the diameter of a red blood cell using a laser	Charting and practical calculations	Written tests
2	2	=	Measuring the thickness of the wire using a laser	Charting and practical calculations	Written tests
3	2	=	Measure the diameter of a circular hole using a laser	Charting and	Written tests

				practical calculations	
4	2	=	Study of the properties of photoresist using a laser	Charting and practical calculations	Written tests
5	2	=	Measuring the wavelength of the laser using the Michelson system	Charting and practical calculations	Written tests
6	2	=	Measuring the wavelength of the laser in different media	Charting and practical calculations	Written tests
7	2	=	Measuring the refractive index of transparent liquid materials using a laser	Charting and practical calculations	Written tests
8	2	=	**Measure the width of the incision using a laser**	Charting and practical calculations	Written tests

11. Course Evaluation

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

Monthly exams	daily and oral exams	project or report	Experimental exams	Final exam
6	2	4	12	60 (40 theoretical +20 experimental)

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	
Main references (sources)	Lasers, Fundamentals and Applications, K. Thyagarajan , Ajoy Ghatak, 2nd Edition, 2011
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

The medical third stage

Theortical part:

Course Description Form

14. Course Name:	
Medical Physics 1	
15. Course Code:	
PHY-312	
16. Semester / Year:	
2024-2025	
17. Description Preparation Date:	
15-9-2024	
18.Available Attendance Forms:	
19/1/2025	
19.Number of Credit Hours (Total) / Number of Units (Total): 2	
2/2/3	
20. Course administrator's name (mention all, if more than one name)	
Name: Dr.Zeina Abbass Salman Email: zsalman@uowasit.edu.iq	
21. Course Objectives	
Course Objectives	• **Emphasis on acquiring advanced knowledge about physical applications in medicine such as the interaction between radiation and living tissues.** • **Focus in the lectures on linking and applying physical principles to medical fields in diagnosis and treatment.** • **Enable students to understand how medical devices work and how to use them.** • **Explain that the physical techniques are the way to develop medical diagnosis and treatment, which helps improve health care.** • **Enable students to use the provided information in their future fields of work as well as the fields of scientific research and practical experiments in a way that contributes to serving society and developing the reality of education in it.**
22. Teaching and Learning Strategies	
Strategy	• **Using presentation, participation, problem solving, and discussion.** • **Using modern technology for education and encouraging students to**

	participate in group discussions. • **Encouraging students to self-learn and form groups to discuss scientific material.**

23. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Introduction	Provide the students with an introduction about medical physics and its applications	Lecture+ Discussion	Exams
2	2	Medical Physics Fields	Definition of medical physics fields	=	=
3	2	Application of Physics in Medicine and Measurements	Principles of medical physics and the measurement techniques	Lecture	=
4	2	Electricity	Electric field, Ohm's law, and methods of measuring the electricity of brain and heart	Lecture+ Discussion	=
5	2	Light and Optics	Visible light and its importance in medical fields	=	=
6	2	Visible light in Medical Applications-Endoscope	The applications of visible light in medical equipment such as endoscope	Lecture	=
7	2	Eye, Vision Defects, and their Correction Methods	The structure of eye, the vision defects, and the available approaches to correct them	=	=
8	2	Pressure in the Eye	The causes of eye pressure and the way of measuring it	=	=
9	2	Force and Laws of Motion	Definition of force and the laws of motion	Lecture+ Discussion	=
10	2	Forces on and by the Body	Introducing the difference between the force on and by the body	=	=
11	2	Static Equilibrium and Elasticity	Laws of the static equilibrium, elasticity in motion, and their importance in medical applications	=	=
12	2	Examples of a Levers System in the Body	Using different examples of levers in the body	=	=
13	2	Energy, Work, and Power	Definitions of energy and its types, word, and power	=	=

14	2	Ways to Transfer Energy into or out of the Body	Methods of transferring energy into and out of the body	=	=
15	2	Energy, Work, and Power of the Body	Definitions of energy, work, and power of the body	=	=

24. Course Evaluation

Exams which include quizzes, midterms, and finals

25. Learning and Teaching Resources

Required textbooks (curricular books, if any)	1) Physics for Scientists and Engineers (with Physics NOW and InfoTrack) Raymond A. Serway and John W. Jewett, Thomson Brooks/Cole © 2004, 6th Edition. 2) Physics for Biology and Medicine, Paul Davidovits, Academic Press, Elsevier 2008, 3rd Edition.
Main references (sources)	1) Medical physics, John R .Cameron, 1978. 2) Medical Physics, Hazem Sakeek, 2014.
Recommended books and references (scientific journals, reports…)	1) Power point slides of Serway book (Physics for Scientists and Engineers) from Cengage Learning Company (http://www.cengage.com). 2) Dr. Taima lectures in medical physics, University of Mosul, 2016.
Electronic References, Websites	Internet sites specialized in teaching and explaining medical physics concepts and applications

Course Description Form

1. Course Name:	
Medical Physics 2	
2. Course Code:	
PHY−322	
3. Semester / Year:	
2024−2025	
4. Description Preparation Date:	
19/1/2025	
5. Available Attendance Forms:	
19/1/2025	
6. Number of Credit Hours (Total) / Number of Units (Total): 2	
2/2/3	
7. Course administrator's name (mention all, if more than one name)	
Name: Dr.Zeina Abbass Salman Email: zsalman@uowasit.edu.iq	
8. Course Objectives	
Course Objectives	• **Emphasis on acquiring advanced knowledge about physical applications in medicine such as the interaction between radiation and living tissues.** • **Focus in the lectures on linking and applying physical principles to medical fields in diagnosis and treatment.** • **Enable students to understand how medical devices work and how to use them.** • **Explain that the physical techniques are the way to develop medical diagnosis and treatment, which helps improve health care.** • **Enable students to use the provided information in their future fields of work as well as the fields of scientific research and practical experiments in a way that contributes to serving society and developing the reality of education in it.**
9. Teaching and Learning Strategies	

Strategy	• **Using presentation, participation, problem solving, and discussion.** • **Using modern technology for education and encouraging students to participate in group discussions.** • **Encouraging students to self-learn and form groups to discuss scientific material.**

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Fluid Mechanics	Definition of fluids and their laws	Lecture+ Discussion	Exams
2	2	Surface Tension	Introduce the surface tension in medical fields and its importance for the living organisms	=	=
3	2	Pressure and its Measurements	Definition of pressure, blood pressure, and methods of measuring blood pressure	Lecture	=
4	2	Applications of Fluid Dynamics	Applications of fluid dynamics in medical field	Lecture+ Discussion	=
5	2	Temperature and Heat	Definitions of temperature, heat, and thermal energy	=	=
6	2	Mechanics of Energy Transfer	Methods of transferring the energy into and out of the body	Lecture	=
7	2	Energy Absorption and Emission by Radiation	Introducing the methods of determining the emitted and absorbed energy by radiation such as Stefan-Boltzmann	=	=
8	2	Sound Waves	Sound waves and their properties	=	=
9	2	Sound Levels	Method of determining sound levels	Lecture+ Discussion	=
10	2	Ultrasound in Medical Diagnosis	Using ultrasound in medical imaging and diagnosis	=	=
11	2	Physics of Cardiovascular System	Physics and its applications in cardiovascular system	=	=
12	2	Radiation	Definition of radiation, its types, and its importance in medical applications	=	=
13	2	Principles of Radiation Protection	Principles of radiation protection when	=	=

			exposing to it as workers or sick people which improve the quality of society health		
14	2	Physics of Nuclear Medicine	Definition of nuclear medicine	=	=
15	2	CT Scan and PET	Some equipment used in nuclear medicine such as CT scan and PET	=	=

11. Course Evaluation

Exams which include quizzes, midterms, and finals

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	3) Physics for Scientists and Engineers (with Physics NOW and InfoTrack) Raymond A. Serway and John W. Jewett, Thomson Brooks/Cole © 2004, 6th Edition. 4) Physics for Biology and Medicine, Paul Davidovits, Academic Press, Elsevier 2008, 3rd Edition.
Main references (sources)	3) Medical physics, John R .Cameron, 1978. 4) Medical Physics, Hazem Sakeek, 2014.
Recommended books and references (scientific journals, reports…)	3) Power point slides of Serway book (Physics for Scientists and Engineers) from Cengage Learning Company (http://www.cengage.com). 4) Dr. Taima lectures in medical physics, University of Mosul, 2016.
Electronic References, Websites	Internet sites specialized in teaching and explaining medical physics concepts and applications

Course Description Form

1. Course Name:
Nuclear and Radiation Physics
2. Course Code:
PHY−313
3. Semester / Year: 3rd medical stage
First semester / 2023−2024
4. Description Preparation Date:
15−9−2024
5. Available Attendance Forms:
Attendance / Biannual
6. Number of Credit Hours (Total) / Number of Units (Total)
2 / 2
7. Course administrator's name (mention all, if more than one name)
Name: Prof. Mohamed Jebur Resen Email: maldhuhaibat@uowasit.edu.iq
8. Course Objectives

Course Objectives	• Enable the student to know the basics of nuclear and radiation physics • Identify the types and characteristics of nuclear radiation • Identify methods for detecting nuclear radiation • Learn about methods for measuring radiation and estimating radiation doses • Knowledge of nuclear models that describe the properties of the nucleus and nuclear forces • Knowing the types of particle radiation accelerators

9. Teaching and Learning Strategies	
Strategy	• Ability to logically analyze • The ability to understand the internal structure of matter • Compare the results obtained from practical experiments with theoretical values and discuss the difference between them

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Referred to in	Nuclei components and their classification	Presentation-discussion	Written tests

		the previous axis, each according to the content			
2	**2**	=	Fundamental forces and properties of nuclei	Presentation-discussion	Written tests
3	**2**	=	Binding energy	Presentation-discussion	Written tests
4	**2**	=	Nuclear size and density	Presentation-discussion	Written tests
5	**2**	=	• Stable and unstable nuclei	Presentation-discussion	Written tests
6	**2**	=	Radioactive Dating	Presentation-discussion	Written tests
7	**2**	=	Nuclear Decay	Presentation-discussion	Written tests
8	**2**	=	Nuclear Decay	Presentation-discussion	Written tests
9	**2**	=	Properties of Nuclear Radiation	Presentation-discussion	Written tests
10	**2**	=	Nuclear Fission and Nuclear Fusion	Presentation-discussion	Written tests
11	**2**	=	Radiation interaction with matter	Presentation-discussion	Written tests
12	**2**	=	Radiation interaction with matter	Presentation-discussion	Written tests
13	**2**	=	Nuclear Models	Presentation-discussion	Written tests
14	**2**	=	Radiation Detectors	Presentation-discussion	Written tests
15	**2**	=	Particles Accelerators	Presentation-discussion	Written tests
16	**2**	=	Exam		

11. Course Evaluation

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

Monthly exams	daily and oral exams	project or report	Experimental exams	Final exam
20	5	3	12	60 (40 theoretical +20 experimental)

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	

Main references (sources)	Introduction to Nuclear and Particle Physics (Second Edition; A. Das & T. Ferbel)
Recommended books and references (scientific journals, reports…)	Introduction Nuclear Engineering (Third Edition; John R. Lamarsh & Anthony Baratta)
Electronic References, Websites	

Course Description Form

1. Course Name:	
Computer and image modeling	
2. Course Code:	
PHY−325	
3. Semester / Year: 3 rd stage /medical physics	
2025− 2024	
4. Description Preparation Date:	
15−9−2024	
5. Available Attendance Forms:	
Presence	
6. Number of Credit Hours (Total) / Number of Units (Total)	
Two theoretical hours, (3 Units) 2/2/3	
7. Course administrator's name (mention all, if more than one name)	
Name: Asst.Prof.Dr. waleed kamil abdulkadhim Email: waleed.k@uowasit.edu.iq	
8. Course Objectives	
Course Objectives	**. Preparing students scientifically, professionally and culturally and enabling them to know scientific facts, concepts and theories.** *** Enabling students to apply scientific methods in addressing life and professional problems and situations.** *** Enabling the graduate to continue his higher studies and absorb the novelties and developments in the field physics Sciences.** *** Helping students to acquire useful trends and values in line with the Arabic authenticity and the principles of Islamic religion and other heavenly religions .** *** Developing the trends and inclinations of students and developing their abilities to face current and future challenges.** *** Development and development of ethical trends and values of scientific research**

9. Teaching and Learning Strategies

Strategy	* Students should be able to adopt scientific thinking methods in the face of problems * Adoption of systematic methods of thinking in harmony with the form and content of available knowledge * Employ cognitive skills in nature * Adopting in-depth learning methods that guarantee understanding and application * Provide learners with

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name Thermodynamics (semester #1 and #2)	Learning method	Evaluation method
1 2 3 4 5 6 7 8 9 10 11	32 hour		Semester#1 1. Introduction to Medical Imaging a Image Analysis, Introduction Computer-Aided Diagnosis (CAD) 2. Processing and analyzing imag produced by the CAD system. 3. Image classification and evaluati a brief review of (3D CAD). 4. Basic steps for restructuring images 5. Introduction to ultrasound imagin 6. Biomedical image classificati methods and techniques. 7. Image classification methods a techniques. Characteristic X-r spectrum 8. Methods and techniques classifying images using (CT scan) 9. Improve wave contrast 10. Methods and techniques for ima classification using (MRI). 11. Chart-based analysis	Deliverance discussion	Written examination

12 13 14 15 16			12. Evaluation strategies for medi image analysis and processi methodologies. 13. Applications 14. Applications 15. Applications 16. the exam		

17. Course Evaluation

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

18. Learning and Teaching Resources

1−Required textbooks (curricular books, if any) 2−Main references (sources) 3−Recommended books and referen (scientific journals, reports…) 4−Electronic References, Websites	**Assessment methods of the above elements** The practical application of the studied ideas is mainly the method of assessment in addition to practical exam. **Text book:** "An introduction to the principles of medical imaging" by Chris Guy and Dominic ffytche. Copyright 2005 by Imperial College Press. **Supplementary references:** 1. "Handbook of Medical Image Processing and Analysis" by Isaac H. Bankman. Copyright © 2009, Elsevier Inc. 2. "Medical Image Analysis Methods" by Lena Costaridou. 2005 by Taylor & Francis Group, LLC. **Other information resources:**

Course Description Form

1. Course Name:
Wave and Ultrasound
2. Course Code:
PHY-323
3. Semester / Year:
2/2024-2025
4. Description Preparation Date:
15-9-2024
5. Available Attendance Forms:
6. Number of Credit Hours (Total) / Number of Units (Total)
2/2
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Khudhair A. Assaf Email:kassaf@uowasit.edu.iq
8. Course Objectives

Course Objectives	• ..... • ..... •

9. Teaching and Learning Strategies	
Strategy	

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	1- Enabling students to identify the physical characteristics of sound and how it is transmitted in different media	Physics of sound	Lecture-Discussion	Quiz- test
2	2	2- Providing students with knowledge of how	Basic acoustic physics and acoustical waves in	Lecture-Discussion	Quiz- test

		ultrasound waves are generated and interacted with the surroundings	human tissue		
3	2	3- Giving students knowledge about the interaction of ultrasound waves with various human tissues and how to use these waves in the medical field, whether in diagnosis or treatment.	Emphasis on ultrasound transmission in soft tissues	Lecture-Discussion	Quiz- test
4	2	4- Teach learners how to generate images resulting from the use of ultrasound waves and the characteristics of these images	Attenuation of sound energy	Lecture-Discussion	Quiz- test
5	2	5- Giving knowledge about the use of the types of transducers used in sonar devices	Attenuation of sound energy	Lecture-Discussion	Quiz- test
6	2		Parameters affecting sound transmission	Lecture-Discussion	Quiz- test
7	2		Parameters affecting sound transmission	Lecture-Discussion	Quiz- test
8	2		Resolution of sound beams	Lecture-Discussion	Quiz- test
9	2		Interaction of ultrasound with tissues	Lecture-Discussion	Quiz- test
10	2		Interaction of ultrasound with tissues	Lecture-Discussion	Quiz- test
11	2		Interaction of ultrasound with tissues	Lecture-Discussion	Quiz- test
12	2		Mechanics of ultrasound production and display	Lecture-Discussion	Quiz- test
13	2		Mechanics of ultrasound production and display	Lecture-Discussion	Quiz- test
14	2		Various transducer designs and construction, quality assurance bio-effect and image artifacts	Lecture-Discussion	Quiz- test
15	2		Methods of Doppler flow analysis	Lecture-Discussion	Quiz- test

11- Course Evaluation

Quarterly evaluation 40% Final Exam 60%	
12- Learning and Teaching Resources	
Required textbooks (curricular books, if any)	
Main references (sources)	**The Physics of Sound Fundamental Physics Ultrasound**
Recommended books and references (scientific journals, reports .....)	
Electronic References, Websites	

Course Description Form

1. Course Name : 2. **Optics and lasers**
3. Course Code PHY-312
4. Semester / Year
Firsit Semester(2025-2024)
5. Description Preparation Date:
15-9-2024
6. Available Attendance Forms
Actual Attendance
7. Number of Credit Hours (Total) / Number of Units (Total)
(2 Theory)/2/3
8. Course administrator's name (mention all, if more than one name)
Name: D.r Sattar Hussein Sweilem **Email: @uowasit.edu.iq**
9. Course Objectives

Course Objectives	**1- Preparing students scientifically, professionally and culturally, and enabling them to know scientific facts, concepts and theories regarding the physics of optics and lasers and their connection to medical fields.** **2- Enabling students to apply scientific and practical methods in addressing life and professional problems and situations** **3- Enabling the graduate to continue his postgraduate studies and absorb new developments and developments in the field of optics and laser physics and their connection to the fields of medical physics.** **4- Preparing students scientifically,**

	professionally, and culturally, and enabling them to know scientific facts, concepts, and theories. **5- Enabling students to apply scientific methods in addressing life and professional problems and situations** **6- Developing and developing ethical trends and values related to scientific research** **7- Enabling students to acquire basic skills related to scientific research and work in the public and private sectors** **8- One of the cognitive objectives is to introduce students to the concepts and basics of general optics and lasers and their applications.** **9- Adopting systematic thinking methods that are compatible with the form and content of available knowledge** **10-Utilizing cognitive and practical skills in nature** **11- Adopting in-depth learning methods that ensure understanding and application** **12-Providing learners with continuous feedback on the acquired knowledge** **13- Acquiring self-regulated learning strategies that are consistent with perceived self-efficacy**

10. Teaching and Learning Strategies

Strategy	Group discussions and assignments Creating an atmosphere of competition among students and treatin individual differences using appropriate educational methods Research groups - nested discussion circles. - Teaching methods include the use of educational technology - Encouraging students to self-learn.

11. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	(2 **Th**)	Referred to in the previous axis, each	**Light Rays**	**Deliverance - discussion**	**Written tests**

		according to the content			
2	(2 **Th)**	Referred to in the previous axis, each according to the content	Wave Optics	**Deliverance - discussion**	**Written tests**
3	(2 **Th)**	Referred to in the previous axis, each according to the content	Light Propagation in Matter	**Deliverance - discussion**	**Written tests**
4	(2 **Th)**	Referred to in the previous axis, each according to the content	Optical Imaging, Lenses	**Deliverance - discussion**	**Written tests**
5	(2 **Th)**	Referred to in the previous axis, each according to the content	Coherence and Interference	**Deliverance - discussion**	**Written tests**
6	(2 **Th)**	Referred to in the previous axis, each according to the content	Light and Matter	**Deliverance - discussion**	**Written tests**
7	(2 **Th)**	Referred to in the previous axis, each according to the content	The Lasers	**Deliverance - discussion**	**Written tests**
8	(2 **Th)**	Referred to in the previous axis, each according to the content	Solid States Lasers -Gas Lasers- Tunable Lasers	**Deliverance - discussion**	**Written tests**
9	(2 **Th)**	Referred to in the previous axis, each according to the content	Laser Dynamics	**Deliverance - discussion**	**Written tests**
10	(2 **Th)**	Referred to in the previous axis, each according to the content	Semiconductor Lasers	**Deliverance - discussion**	**Written tests**
11	(2 **Th)**	Referred to in the previous axis, each according to the content	Diode Laser	**Deliverance - discussion**	**Written tests**
12	(2 **Th)**	Referred to in the previous axis, each according to the content	Light Sensors	**Deliverance - discussion**	**Written tests**
13	(2 **Th)**	Referred to in the previous axis, each according to the	Quantum Sensors	**Deliverance - discussion**	Written tests

		content			
14	(2 **Th)**	Referred to in the previous axis, each according to the content	Laser spectroscopy: laser induced Fluorescence- Absorption and Dispersion	**Deliverance - discussion**	Written tests
15	(2 **h)**	Referred to in the previous axis, each according to the content	**Laser spectroscopy: The spectral line width- Doppler- Free spectroscopy – Light Forces**	**Deliverance - discussion**	**Written tests**

12. Course Evaluation

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

Course	**Daily preparation, daily and oral exams**	**Daily assignments**	**reports**	**Seminars**	**Mid-term Exam**	**Final - Exam**
2nd	**15**	**15**	**5**	**5**	**10**	**50**

13. Learning and Teaching Resources

Required textbooks (curricular books, if any)	- Optics, Light, and Lasers" by Dieter Meschede, 2004 Wiley-VCH Verlag GmbH & Co. KGAA, Weinheim.
Main references (sources)	Laser Fundamentals , William T. Silfvast
Recommended books and references (scientific journals, reports…)	1-Handbook of Optics" 2nd ed. Vol. III "Classical, Vision and x-ray optics" by Michael Bass. 2000, McGraw-Hill. "2-Handbook of Optics" 3rd ed. Vol. I "Geometrical and Physics optics, polarized Light, Components and Instruments" by Michael Bass. 2000, McGraw-Hill
Electronic References, Websites	https://www.hazemsakeek.net/ https://www.googlescholar

Course Description Form

1. Course Name:
Biochemistry
2. Course Code:
PHY-313
3. Semester / Year: 1 semister/ 3rd stage
2024-2025
4. Description Preparation Date:
15-9-2024
5. Available Attendance Forms:
6. Number of Credit Hours (Total) / Number of Units (Total)
2/2/3
7. Course administrator's name (mention all, if more than one name)
Name: Raghda Saad Jamel Email: raghda.saad@uowasit.edu.iq
8. Course Objectives

Course Objectives	• ..... • ..... •

9. Teaching and Learning Strategies	
Strategy	

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2		Introduction to the principles of biochemistry	Lecture - discussion	Written tests and quizzes
2	2		Carbohydrates Definition, classification and importance of carohydrate	Lecture - discussion	Written tests and quizzes

3	2		Photoactivity of sugars, their ring structure, and the glycosidic bond and their chemical structure	Lecture - discussion	Written tests and quizzes
4	2		Monosaccharides, disaccharides and polysaccharides Carbohydrate metabolism	Lecture - discussion	Written tests and quizzes
5	2		amino acids General properties of amino acids, their types, and peptide bonds	Lecture - discussion	
6	2		Definition of proteins, their functions and classification	Lecture - discussion	Written tests and quizzes
7	2		Metabolism of proteins and production of bioenergy	Lecture - discussion	Written tests and quizzes
8	2		Fats Classification of fats and their properties Fatty acids, their types, and ester bonds	Lecture - discussion	Written tests and quizzes
9	2		Chemical composition of fats Phospholipids and steroids (cholesterol)	Lecture - discussion	Written tests and quizzes
10	2		Fat metabolism and bioenergy production	Lecture - discussion	Written tests and quizzes
11	2		Enzymes The chemical nature of enzymes, their classification, and their mechanism of action	Lecture - discussion	Written tests and quizzes
12	2		Factors affecting enzyme effectiveness	Lecture - discussion	Written tests and quizzes
13	2		Nucleic acids Chemical nature and structure of nucleotides and nucleosides	Lecture - discussion	Written tests and quizzes
14	2		Nitrogen bases and nucleic acids (DNA, RNA) and their degradation chemically and enzymatically	Lecture - discussion	Written tests and quizzes
15	2		Exam	Lecture - discussion	Written tests and quizzes

11. . Course Evaluation	
Theoretical exam 28 + practical exam 12+ final 60	
12. . Learning and Teaching Resources 13. Required textbooks (methodology, if any)	
.	**1 V. W. Rodwell, D. Bender and K. M. Botham. Harper's Illustrated Biochemistry. McGraw-Hill Education. 31st edition, (2018)** **2. D. L. Nelson and M. M. Cox. Lehnin Principles of Biochemistry. W.H. Freeman. edition, (2017)**

Main references (sources)	Biochemistry Dr. Farid and Dr. Dalia (2007)
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	

Course Description Form

1. Course Name : **Biostatistics1**
2. Course Code 3. PHY-415
4. Semester / Year
First Semester(2025−2024)
5. Description Preparation Date:.
15−9−2024
6. Available Attendance Forms
Actual Attendance
7. Number of Credit Hours (Total) / Number of Units (Total)
2/2 / 2 units
8. Course administrator's name (mention all, if more than one name)
Name:D.r Faiq Jameel Hassan Email: @uowasit.edu.iq
9. Course Objectives

Course Objectives	**- It makes the student familiar and aware of the most important characteristics of the statistics course** **Especially the vital part of it, which is concerned with statistical equations** **For biological specializations, which give the amount of significant changes** **for the extracted values.** **- Enabling the student to understand the principles of statistics.** **- Mastering applied methods in statistics.** **- Enabling the student to use statistical methods and standards theoretically and scientifically.** **- Identifying the basic components of the statistics curriculum.** **- Learn about methods of applying statistics**

	using statistical programs on the computer. **- Identify statistical metrics.** **- The ability to analyze life phenomena statistically.**

10. Teaching and Learning Strategies

Strategy	Group discussions and assignments Creating an atmosphere of competition among students and treatin individual differences using appropriate educational methods Research groups - nested discussion circles. - Teaching methods include the use of educational technology - Encouraging students to self-learn.

11. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	(2 **Th)**	Definition of statistics and biostatistics with examples an Population and samples and methods of sampling	**Introduction to statistics**	**Deliverance - discussion**	**General questions and discussion**
2	(2 **Th)**	Definition of statistics and biostatistics with examples an Population and samples and methods of sampling	Introduction to statistics	**Deliverance - discussion**	**General questions and discussion**
3	(2 **Th)**	Central Tendency measureme (Mean, Median, and Mode)	Central Tendency measurements	**Deliverance - discussion**	**General questions and discussion**
4	(2 **Th)**	Central Tendency measureme (Mean, Median, and Mode)	Central Tendency measurements	**Deliverance - discussion**	**General questions and discussion**
5	(2 **Th)**	Central Tendency measureme (Mean, Median, and Mode)	Central Tendency measurements	**Deliverance - discussion**	**General questions and discussion**
6	(2 **Th)**	Measurements of variations (Mean deviation, standard Deviation and Variance)	Measure ments of variations	**Deliverance - discussion**	**General questions and discussion**
7	(2 **Th)**	Measurements of variations (Mean deviation, standard Deviation and Variance)	Measurements of variations	**Deliverance - discussion**	**General questions and discussion**
8	(2 **Th)**	Elementary probability rules And Random variables	Probability		**General questions and discussion**
9	(2 **Th)**	Elementary probability rules And Random variables	Probability	**Deliverance - discussion**	**General questions and discussion**
10	(2 **Th)**	Elementary probability rules And Random variables	Probability	**Deliverance - discussion**	**General questions and discussion**

11	(2 **Th)**	Elementary probability rules And Random variables	Probability	**Deliverance - discussion**	**General questions and discussion**
12	(2 **Th)**	Statistical Distributions (Norm Distribution and Binomial Distribution) and t-test and Ch square test	Statistical Distributions	**Deliverance - discussion**	**General questions and discussion**
13	(2 **Th)**	Statistical Distributions (Norm Distribution and Binomial Distribution) and t-test and Ch square test	Statistical Distributions	**Deliverance - discussion**	General questions and discussion
14	(2 **Th)**	Statistical Distributions (Norm Distribution and Binomial Distribution) and t-test and Ch square test	Statistical Distributions	**Deliverance - discussion**	General questions and discussion
15	(2 **h)**	Statistical Distributions (Norm Distribution and Binomial Distribution) and t-test and Ch square test	**Statistical Distributions**	**Deliverance - discussion**	**General questions and discussion**
16	(2h)		**Second Exam**		

12. Course Evaluation

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

Course	Daily preparation, daily and oral exams	Daily assignments	reports	Seminars	Mid-term Exam	Final -Exar
1st	15	15	5	5	10	50

13. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Donald N. Forthofer, Eun Sul Lee, Introduction to Biostatistics: A Guide to Design, Analysis, and Discovery, Academic Press INC. (1995)
Main references (sources)	Book Introduction to Life Statistics for Life Sciences translated by Dr. Ahmed Al-Khayat and others.
Recommended books and references (scientific journals, reports…)	The Book of Life Statistics by Abdul Khaliq Abdul Jabbar Al-Naqib

Electronic References, Websites	

Course Description Form

1. Course Name :**Biostatistics 2**	
2. Course Code PHY-427	
3. Semester / Year	
second Semester(2025-2024)	
4. Description Preparation Date:.	
15/9/2024	
5. Available Attendance Forms	
Actual Attendance	
6. Number of Credit Hours (Total) / Number of Units (Total)	
2/2 / 2 units	
7. Course administrator's name (mention all, if more than one name)	
Name:D.r Faiq Jameel Hassan **Email: @uowasit.edu.iq**	
8. Course Objectives	
Course Objectives	**- It makes the student familiar and aware of the most important characteristics of the statistics course** **Especially the vital part of it, which is concerned with statistical equations** **For biological specializations, which give the amount of significant changes** **for the extracted values.** **- Enabling the student to understand the principles of statistics.** **- Mastering applied methods in statistics.** **- Enabling the student to use statistical**

	methods and standards theoretically and scientifically. **- Identifying the basic components of the statistics curriculum.** **- Learn about methods of applying statistics using statistical programs on the computer.** **- Identify statistical metrics.** **- The ability to analyze life phenomena statistically.**

9. Teaching and Learning Strategies

Strategy	Group discussions and assignments Creating an atmosphere of competition among students and treatin individual differences using appropriate educational methods Research groups - nested discussion circles. - Teaching methods include the use of educational technology - Encouraging students to self-learn.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	(2 **Th)**	Introduction to Medi statistics	**Introduction to statistics**	**Deliverance - discussion**	**General questions and discussion**
2	(2 **Th)**	Introduction to Medi statistics	Introduction to statistics	**Deliverance - discussion**	**General questions and discussion**
3	(2 **Th)**	Random variables	Random variables	**Deliverance - discussion**	**General questions and discussion**
4	(2 **Th)**	Random variables	Random variables	**Deliverance - discussion**	**General questions and discussion**
5	(2 **Th)**	Random variables	Random variables	**Deliverance - discussion**	**General questions and discussion**
6	(2 **Th)**	Random variables	Distrbutions	**Deliverance - discussion**	**General questions and discussion**
7	(2 **Th)**	Random variables	Distrbutions	**Deliverance - discussion**	**General questions and discussion**
8	(2 **Th)**	Variability in estimat	Estimatation		**General questions and discussion**
9	(2 **Th)**	Variability in estimat	Estimatation	**Deliverance - discussion**	**General questions and discussion**

10	(2 **Th)**	Variability in estimat	Estimatation	**Deliverance - discussion**	**General questions and discussion**
11	(2 **Th)**	Variability in estimat	Estimatation	**Deliverance - discussion**	**General questions and discussion**
12	(2 **Th)**	Confidence intervals and Hypothesis testi	Confidence intervals	**Deliverance - discussion**	**General questions and discussion**
13	(2 **Th)**	Confidence intervals and Hypothesis testi	Confidence intervals	**Deliverance - discussion**	General questions and discussion
14	(2 **Th)**	Confidence intervals and Hypothesis testi	Confidence intervals	**Deliverance - discussion**	General questions and discussion
15	(2 **h)**	Confidence intervals and Hypothesis testi	**Confidence intervals**	**Deliverance - discussion**	**General questions and discussion**
16	(2h)		**Second Exam**		

11. Course Evaluation

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

Course	Daily preparation, daily and oral exams	Daily assignments	reports	Seminars	Mid-term Exam	Final -Exam
1st	**15**	**15**	**5**	**5**	**10**	**50**

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Donald N. Forthofer, Eun Sul Lee, Introduction to Biostatistics: A Guide to Design, Analysis, and Discovery, Academic Press INC. (1995)
Main references (sources)	Book Introduction to Life Statistics for Life Sciences translated by Dr. Ahmed Al-Khayat and others.
Recommended books and references (scientific journals, reports…)	The Book of Life Statistics by Abdul Khaliq Abdul Jabbar Al-Naqib

Electronic References, Websites	

Practical

Course Description Form

1. Course Name:					
Bio Electronics – Experimental					
2. Course Code:					
PHY−425					
3. Semester / Year:					
Second semester / 2025−2024					
4. Description Preparation Date:					
15−9−2024					
5. Available Attendance Forms:					
Attendance in class					
6. Number of Credit Hours (Total) / Number of Units (Total)					
2 / 2					
7. Course administrator's name (mention all, if more than one name)					
Name: Dr.Fatima Fadhil Abbas Email: fatima@uowasit.edu.iq					
8. Course Objectives					
Course Objectives	• Enable the student to connect electronic circuits • The student's knowledge of comparing the results obtained experimentally with theoretical results • Analyze electronic circuits and discuss the results				
9. Teaching and Learning Strategies					
Strategy	• Ability to logically analyze • The ability to know how to choose the appropriate electronic parts for the experiment • Ability to draw and discuss results				
10. Course Structure					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**

1	2	Ohm's law	Design electronic circuit and practical calculations	Simulation experiment by Multisim	Tests
2	2	Current divider	Design electronic circuit and practical calculations	Simulation experiment by Multisim	Tests
3	2	voltage divider	Design electronic circuit and practical calculations	Simulation experiment by Multisim	Tests
4	2	Bio amplifier	Design electronic circuit and practical calculations	Simulation experiment by Multisim	Tests
5	2	Phase Detector	Design electronic circuit and practical calculations	Simulation experiment by Multisim	Tests
6	2	Notch filter	Design electronic circuit and practical calculations	Simulation experiment by Multisim	Tests
7	2	Familiarization of IC 4051	Design electronic circuit and practical calculations	Simulation experiment by Multisim	Tests
8	2	Threshold detector	Design electronic circuit and practical calculations	Simulation experiment by Multisim	Tests
9	2	*Review and audit*			
10	2	**Mid-term exam**			Tests
11	2				
12	2				

11. Course Evaluation

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

Monthly exams	daily and oral exams	project or report	Experimental exams	Final exam
10	10	40	40	60 (40 theoretical +20 experimental)

12. Learning and Teaching Resources

Required textbooks (curricular books, if any	
Main references (sources)	Bioelectronics: From Theory to Applications" by Sergey Shleev, Anthony P.F. Turner, and Ashutosh Tiwari . "Biosensors and Bioelectronics" by Elsevier .

	"Bioelectronics: A Study in Cellular Regulations, Defense, and Cancer" by Robert F. Zalups and Scott S. Ickes . "Bioelectronics Handbook: MOSFETs, Biosensors, and Neurons" by S.N. Santosh and Krishnan C. Sabu . "Introduction to Bioelectronics: For Engineers and Physical Scientists" by Elliott S. Elson.
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	Internet sites in general specialized in teaching and explaining Analog Electronics

Course Description Form

1. Course Name:	
Biochemistry practical	
2. Course Code:	
PHY−413	
3. Semester / Year:	
First semester / 2025−2024	
4. Description Preparation Date:	
15−9−2024	
5. Available Attendance Forms:	
Attendance / Biannual	
6. Number of Credit Hours (Total) / Number of Units (Total)	
2 / 2	
7. Course administrator's name (mention all, if more than one name)	
Name: Assist lecture Raghda Saad Jamel Email: raghda-saad@uowasit.edu.iq	
8. Course Objectives	
Course Objectives	• Explains the principles and purposes of various biochemical and biological processes • Distinguish the different methods of dividing biological molecules and their different properties • Interprets the results of chemical analysis of biological molecules quantitatively and descriptively • Utilizes the physical and chemical properties of biological molecules in conducting laboratory experiments

9. Teaching and Learning Strategies

Strategy	• Organize the lecture well • Accommodating students' individual differences • Developing the skill of self-evaluation through what tests provide to students

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Referred to in the previous axis, each according to the content	A general introduction to practical methods in biochemistry and identification of reagents and materials used	Analysis of the results	Written tests
2	2	=	Sugars Detection of sugars and differentiation between monosaccharides and disaccharides	Analysis of the results	Written tests
3	2	=	Detection of reducing and non-reducing sugars	Analysis of the results	Written tests
4	2	=	Distinguish between reducing mono- and disaccharides	Analysis of the results	Written tests
5	2	=	Detection of polysaccharides	Analysis of the results	Written tests
6	2	=	Mid-term exam		
7	2	=	Protein experiments	Analysis of the results	Written tests
8	2	=	Amino acid experiments	Analysis of the results	Written tests
9	2	=	Cholesterol detection	Analysis of the results	Written tests
10	2	=	Diabetes detection	Analysis of the results	Written tests
11	2	=	Detection of amylase enzyme	Analysis of the results	
12	2		Mid-term exam		

11. Course Evaluation

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

Monthly exams	daily and oral	project or	Experimental exams	Final exam

	exams	report		
6	2	4	12	60
				(40 theoretical +20 experimental)

12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	1. V. W. Rodwell, D. Bender and K. M. Botham. Harper's Illustrated Biochemistry. McGraw-Hill Education. 31st edition, (2018) 2. D. L. Nelson and M. M. Cox. Lehninger Principles of Biochemistry. W.H. Freeman. 7th edition, (2017)
Main references (sources)	
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

Course Description Form

1. Course Name:	
Physiology	
2. Course Code:	
PHY-425	
3. Semester / Year:	
Semester 2nd / 2024 – 2025	
4. Description Preparation Date:	
15-9-2024	
5. Available Attendance Forms:	
Presence	
6. Number of Credit Hours (Total) / Number of Units (Total)	
(2 Hours Theory) and (2 Hours Practical)	
7. Course administrator's name (Mention all, if more than one name)	
Name: Prof. Dr. Jafar Abbas Issa Al-Maamori Email: jalmaamori@uowasit.edu.iq	
8. Course Objectives	
	Providing students with scientific concepts in the fields of fundamentals of physiology

Course Objectives	and its applications as follows: • Teaching students and introducing them to the physiology principles and the functions of some major physiological body systems and their role in maintaining the body's internal homeostasis. • An understanding of the special mechanisms used to transport selected molecules that cannot cross the plasma membrane at functional cellular level for biological system. • Study human physiology as a model for physiological processes in other organisms. • Further develop the practical biological skills introduced in this physiology course. • Basic knowledge of performing, analyzing, and reporting experiments and observations in physiology.

9. Teaching and Learning Strategies

Strategy	• **Lectures:** In traditional lecture-based courses, teachers deliver content to students through oral presentations. This format is often supported by slides, multimedia, or aids to enhance understanding. • **Self-learning**: Contributes to the acquisition of specialized knowledge and promotes self-motivation. • **Examinations:** Examinations demonstrate the achievement of an appropriate level of specialized knowledge in physiology, with an emphasis on understanding and communication (essay and problem-solving questions) or recall of factual knowledge (multiple-choice or short-answer tests). • **Practical exercises:** Allow students to use knowledge gained from lectures and support the development of key skills in practice • Using modern educational technology :As supportive teaching methods

10. Course Structure

Week	Hours	Required learning outcomes	Unit or subject name (Theoretical)	Learning method (Practical)	Evaluation method
1	4	Mentioned within previous point according to the contents	Introduction to physiology and its general principles	General rules of the laboratory and safety procedures	Daily quizzes, live questioning and discussion
2	4	=	Cell structure and physiology	Introduction to Blood Physiology	Daily quizzes, live questioning and discussion
3	4	=	Exchange through cell membrane	Osmotic relationship and permeability of erythrocyte membranes	Daily quizzes, live questioning and discussion
4	4	=	Physiology of Cardiovascular system (circulatory system); Excitation and transmission of heartbeat	Red blood cell count	Daily quizzes, live questioning and discussion
5	4	=	Nervous system physiology	Total leukocyte (WBC) count; Differential leukocyte count	Daily quizzes, live questioning and discussion

6	4	=	First Exam.	First Exam.	Exam.
7	4	=	Urinary physiology regulation and exchange between body fluids.	Determination of hemoglobin concentration	Daily quizzes, live questioning and discussion
8	4	=	The acid-base balance of the body	Determination of bleeding time and coagulation time	Daily quizzes, live questioning and discussion
9	4	=	Muscular system physiology	Packed cells volume;	Daily quizzes, live questioning and discussion
10	4	=	Respiratory system physiology	Red blood cell sedimentation rate (ESR)	Daily quizzes, live questioning and discussion
11	4	=	Digestive system Physiology (Digestion and absorption)	Electrocardiography (ECG)	Daily quizzes, live questioning and discussion
12	4	=	Endocrine system; types of endocrine glands.	Blood pressure;	Daily quizzes, live questioning and discussion
13	4	=	The pituitary and thyroid glands	Respiratory experiments (respiratory rate and volumes)	Daily quizzes, live questioning and discussion
14	4	=	Male and Female reproductive systems	Insulin regulation of blood sugar	Daily quizzes, live questioning and discussion
15	4	=	Second exam.	Second Exam.	Exam.

11.Course Evaluation

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

Course	Theoretical			Practical			Final - Exam
	First Exam.	First Exam.	Quizzes	First Exam.	First Exam.	Quizzes	
2nd	12	12	4	4	4	4	60

12.Learning and Teaching Resources

Required Textbooks (Curricular Books, if any)	Non
Main References (Sources)	1. Al-Aluji, Sabah Nasser. **Physiology**, University of Baghdad (2014). 2. Kamari, Ahmed. **Introduction To Human Physiology and Anatomy**. University of Aleppo Publications (2007). 3. Rye, C.; Wise, R.; Desaix, J.; Choi, J and Avissar, Y. **Biology**. Rice University (2017).
Recommended Books and References (Scientific Journals, Reports...)	Physiology periodicals issued by Elsevier Publishing
Electronic References, Websites	https://www.physiology.org/career/teaching-learning-resources/student-resources/what-is-physiology?SSO=Y

Course Description Form

26. Course Name:	
Quantum Mechanics	
27. Course Code:	
PHY−323	
28. Semester / Year:	
2024 − 2025	
29. Description Preparation Date:	
15−9−2024	
30.Available Attendance Forms:	
Presence	
31.Number of Credit Hours (Total) / Number of Units (Total)	
2/2	
32. Course administrator's name (mention all, if more than one name)	
Name: Abbas Fadhel Essa Email: afadhel@uowasit.edu.iq	
33. Course Objectives	
Course Objectives	• **Preparing students scientifically, professionally and culturally and enabling them to know scientific facts, concepts and theories.** * **Enabling students to apply scientific methods in addressing life and professional problems and situations.** * **Enabling the graduate to continue his higher studies and absorb the novelties and developments in the field physics Sciences.** * **Helping students to acquire useful trends and values in line with the Arabic authenticity and the principles of the Islamic religion** **And other heavenly religions .** * **Developing the trends and inclinations of students and developing their abilities to face current and future challenges.** * **Development and development of ethical trends and values of scientific research**
34. Teaching and Learning Strategies	
Strategy	* Students should be able to adopt scientific thinking methods in the face of problems * Adoption of systematic methods of thinking in harmony with the form and content of available knowledge

	* Employ cognitive skills in nature * Adopting in-depth learning methods that guarantee understanding and application * Provide learners with

35. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name QM (semester #2)	Learning method	Evaluation method
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15	30		مبادىء ميكانيك الكم ، الدالة الموجية ، خصائص الدالة الموجية مبدأ الاحتمالية / التماثل / رمز ديراك المؤثرات / مؤثر هاملتون ، المؤثرات التبادلية حل معادلة شرودنكر غير المعتمدة على الزمن (في بعد واحد وثلاثة ابعاد) حل معادلة شرودنكر المعتمدة على الزمن (في بعد واحد وثلاثة ابعاد) جسيم محصور في صندوق في بعد واحد وثلاثة ابعاد جهد البئر مع اعماق محددة وغير محددة حاجز الجهد تأثير النفق مسائل محلولة المتذبذب التوافقي البسيط حل معادلة شرودنكر للمتذبذب التوافقي البسيط وايجاد مستويات الطاقة حل معادلة شرودنكر في الاحداثيات الكروية ذرة الهيدروجين امتحان الفصل	Presence	

36. Course Evaluation

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

37. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Introduction of QM
Main references (sources)	QM
Recommended books and references (scientific journals, reports…)	Principle of QM
Electronic References, Websites	From internet

Course Description Form

1. Course Name:
Radiation Protection
2. Course Code:
PHY-415
3. Semester / Year:
First / 2025-2024
4. Description Preparation Date:
15/9/2024
5. Available Attendance Forms:
Attendance/semester
6. Number of Credit Hours (Total) / Number of Units (Total)
2 hours / 3 units
7. Course administrator's name (mention all, if more than one name)
Name: **Associate Professor Dr .Maitham S. Amana** **Email:** malsalem@uowasit.edu.iq
8. Course Objectives

Course Objectives	● Preparing students scientifically, professionally, and culturally, and enabling them to know scientific facts, concepts, and theories. ● Enabling students to apply scientific methods in addressing life and professional problems and situations. ● Enabling the graduate to continue his postgraduate studies and absorb new developments and developments in the field of physical sciences and medical physics.

9. Teaching and Learning Strategies

Strategy	• **For interactive teaching and classroom discussions** • **Problem-based learning** • **Hands-on learning and laboratory experiments**

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Referred to in the previous axis	*Atomic Structure*	Presentation-discussion	Written/Oral Test
2	2	=	Radioactivity &Radiation	Presentation-discussion	Written/Oral Test
3	2	=	Gamma-Ray Emission.	Presentation-discussion	Written/Oral Test

4	2	=	Radioactive Decay	Presentation-discussion	Written/Oral Test
5	2	=	X-Rays	Presentation-discussion	Written/Oral Test
6	2	=	*The Production of X-Rays*	Presentation-discussion	Written/Oral Test
7	2	=	Sources of Radiation	Presentation-discussion	Written/Oral Test
8	2	=	Medical Radiation Sources	Presentation-discussion	Written/Oral Test
9	2	=	Comparison of Radiation Doses	Presentation-discussion	Written/Oral Test
10	2	=	Units of Radiation Protection	Presentation-discussion	Written/Oral Test
11	2	=	Principles of Radiation Protections	Presentation-discussion	Written/Oral Test
12	2	=	Methods for maximizing distance from sources of radiation	Presentation-discussion	Written/Oral Test
13	2	=	Proper uses of shielding	Presentation-discussion	Written/Oral Test
14	2	=	Biological Effects	Presentation-discussion	Written/Oral Test
15	2	=	Applications of radiation	Presentation-discussion	Written/Oral Test
16	2	=	**Test**	Presentation-discussion	Written/Oral Test

11.Course Evaluation

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

1- Daily preparation 5
2- Daily exams and attendance 10
3- Theoretical exams 25
4- Final exam 60

12.Learning and Teaching Resources

Required textbooks (curricular books, if any)	
Main references (sources)	Davis, M. L., & Masten, S. J. (2019). *Principles of environmental engineering and science* (3rd ed.). McGraw-Hill Education Stabin, M. G. (Ed.). (2007). *Radiation protection and dosimetry*. New York, NY: Springer New York.
Recommended books and references (scientific journals, reports...)	Sherer, M. A. S., Visconti, P. J., Ritenour, E. R., & K Haynes, M. S. R. S. (2013). *Radiation protectior medical radiography*. Elsevier Health Sciences.
Electronic References, Websites	

Course Description Form

38. Course Name:
Laser in medicine
39. Course Code:
PHY−324
40. Semester / Year:
2024 − 2025
41. Description Preparation Date:
15−9−2024
42.Available Attendance Forms:
Presence
43.Number of Credit Hours (Total) / Number of Units (Total)
(2h theoretical) & (2Units) and practical (2 h)
44. Course administrator's name (mention all, if more than one name)
Name: Asst.Prof . Dr Hanan Abd Ali Thjeel Email: halukely@uowasit.edu.iq
45. Course Objectives

Course Objectives	• **Enable the student to know the basics and theory of laser** • **The course explains the properties of lasers in medicine** • **It covers the main topics and concepts presented by laser applied in medicine** • **The purpose of this course is to study various medical applications.** .

46. Teaching and Learning Strategies

Strategy	**1. The main strategy for delivering this module is to encourage student's participation in the exercises while refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials, and simple experiments involving interesting sampling activities for students.** **2. Make the student able to use the device of laser** **3. The student should be able to have more formation about uses of laser**

47. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learnin	Evaluation

				g method	method
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15	30	A-Knowledge: (Specific facts and knowledge of concepts, theories, formula etc.) B-Cognitive Skills: (Thinking, problem-solving) C- Interpersonal skills and responsibilities: (group participation, leadership, perso responsibility, ethical and moral behavior, capacity for self-directed learning) D- Analysis and communication:) communication, mathematical and I skills) Assessment methods for above elements	- **1. Historical perspective** **2 Types of lasers** **3 Lasers compared with conventi light sources** **4. Models of laser–tissue interacti 8** **4.1. Exposures and exposure rates** **The electromechan (photomechanical or ph disruptive) mode** **5. Ablation** **6.Photothermal (coagulative vaporizing) processes** **7 Photochemical (photodynan reactions** **8 Biostimulation and wound healin** **9. Practical considerations of laser medicine** **10. Factors influencing laser choice** **10.1Laser delivery systems** **11 Laser safety 13** **12 Therapeutic applications of lase** **21-1. Lasers in dermatology** **13 Lasers in ophthalmology** **14 Lasers in dentistry** **15. Lasers in otolaryngology** **And Diagnostic applications of lase**	Presence	-Theoretical exam -oral exam -Reports

48. Course Evaluation

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

49. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Textbook:
Main references (sources)	.
Recommended books and references (scientific journals, reports…)	. Supplementary references 1- Lasers in Medicine and Surgery 2008 : The National Center Optics and Photonics Education, an initiative of the Advanc Technological Education (ATE) program of the National Science Foundation. 2- Medical Applications of Lasers. Edited by D. R. Vij and K.Mahesh. Copyright © 2002 by Springer Science Business 3- Supportive References 1- Lasers in Medicine, Edited by Ronald W. Waynant, CRC Press LLC, 2000 N.W. Corporate Blvd., Boca Raton, Florida 33431. 2- Lasers Basics, Advances and Applications, Edited by Han Joachim Eichler • Jürgen Eichler Oliver Lux© Springer Natu Switzerland AG 2018
Spectra References, Websites	

The general forth stage

Theoretical

Course Description Form

1. Course Name:
Solid State Physics
2. Course Code:
PHY−412
3. Semester / Year:
2025 − 2024
4. Description Preparation Date:
15−9−2024
5. Available Attendance Forms:
Presence
6. Number of Credit Hours (Total) / Number of Units (Total)
2/2/ (3 Units)
7. Course administrator's name (mention all, if more than one name)
Name: Abbas Fadhel Essa Email: afadhel@uowasit.edu.iq
8. Course Objectives

Course Objectives	• **Preparing students scientifically, professionally and culturally and enabling them to know scientific facts, concepts and theories.** * **Enabling students to apply scientific methods in addressing life and professional problems and situations.** * **Enabling the graduate to continue his higher studies and absorb the novelties and developments in the field physics Sciences.** * **Helping students to acquire useful trends and values in line with the Arabic authenticity and the principles of the Islamic religion** **And other heavenly religions .** * **Developing the trends and inclinations of students and developing their abilities to face current and future challenges.** * **Development and development of ethical trends and values of scientific research**

9. Teaching and Learning Strategies

Strategy	* Students should be able to adopt scientific thinking methods in the face of problems * Adoption of systematic methods of thinking in harmony with the form and content of available knowledge * Employ cognitive skills in nature * Adopting in-depth learning methods that guarantee understanding and application * Provide learners with

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name SSP (semester #1 and #2)	Learning method	Evaluation method
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 1 2	30 30		• Phonons and lattice vibration • Inelastic scattering of photons by phonon • Monatomic and diatomic lattices • Phase velocity and group velocity • Heat capacity ,classical theory and Einstei model • Debye model ,enharmonic crystals • Thermal expansion ,thermal conductivity and thermal resistivity • Classical theory in conductivity (Drude an Lorentz) theory • Hall effects • Quantum free electron , Fermi – Dirac • Density of state ,thermal conductivity of metal • Ratio of thermal to electrical conductivity l(• Band theory ,Nearly free electron model • Forbidden energy gap and Block function • First examination Semester #2 • Effective mass ,holes and Fermi surfac construction • Band gap, Silicon and Germanium	Presence	

3 4 5 6 7 8 9 10 11 12 13 14 15			• Intrinsic and extrinsic semiconductors • Mobility and electrical conductivity • Point and line defects • Surface and volume defects • Superconductivity , Critical temperatu • Meissnar effect and BCS theory • Uses of superconductivity • High temperature superconductors • Magnetic properties • Diamagnetic and paramagnetic • Ferromagnetic and antiferromagnetic • Nuclear magnetic resonance Second examination		

11. Course Evaluation

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

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Solid state physics , kittle,8th, 2008
Main references (sources)	Solid state physics , kittle,8th, 2008
Recommended books and references (scientific journals, reports…)	Solis state physics, Blakmore
Electronic References, Websites	From internet

Course Description Form

1. Course Name:	
Thin films	
2. Course Code:	
PHY−424	
3. Semester / Year: 4th stage	
2025− 2024	
4. Description Preparation Date:	
15−9−2024	
5. Available Attendance Forms:	
Presence	
6. Number of Credit Hours (Total) / Number of Units (Total)	
2/ (2 Units)	
7. Course administrator's name (mention all, if more than one name)	
Name: Ghada Ayad Kadhim Email: gayad@uowasit.edu.iq	
8. Course Objectives	
Course Objectiv	• **Preparing students to prepare scientifically to understand what nanomaterials are and their relationship to thin films.**

	• **Enhancing the scientific aspect of thin film deposition and its deposition techniques.** • **Contributing to knowledge of the advantages of the most important film deposition techniques.** • **Contributing to knowledge of the disadvantages of the most important thin film deposition techniques.** • **Contribute to knowledge of the applications of these technologies in many aspects of life.** • **Contributing to knowledge of the properties of prepared thin films by identifying some of the techniques used such as XRD, AFM, SEM, and TEM.** • **Using the obtained results to benefit from them in our reality, such as using them in solar cells ar types of environmental sensors.**

9. Teaching and Learning Strategies

Strategy	* **Students should be able to adopt scientific thinking methods in the face of problems** * **Adoption of systematic methods of thinking in harmony with the form and content of availa knowledge** * **Employ cognitive skills in nature** * **Adopting in-depth learning methods that guarantee understanding and application** * **Provide learners with**

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name Thin films (semester #1 and #2)	Learning method	Evaluation method
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 1	30	-The ability to understand and perceive -Analysis of the given material. -Compatibility between accounts-Mathematical an practical results obtained through simulation progra -The ability to deposit membranes Kind and in different ways Physical an chemical. -The ability to solve proble Scientific and practical issues. -Utilizing the results obtai To benefit from it in our reality, such as using it in solar cells and types of environmental sensors. -creativity and innovation	-What is a thin film -Special Properties of Thin Films -Chemical Spray Pyrolysis Technique (CSP): -Advantages and disadvantages of Chemical Spray Pyrolysis -Sol-Gel Method -Spin coating and key stages of spin coating -Dip-coating -exam -Applications the Dip coatings -Advantages and disadvantages of dip coating -Electrolytic Anodization -Chemical Reduction Plating -Electrochemical polymerization -Electrophoretic Deposition -Vacuum concepts Semester #2 System volumes, leak rates and pumping speeds	Presence	-Theoretical exam -oral exam -Reports

2 3 4 5 6 7 8 9 9 10 11 12 13 14 15	30		-The idea of conductance -Measurement of system pressu -Physical Vapor Deposition (PVD -Thermal evaporation -Some metals films that are easil deposited by evaporation -Resistance heating technique -Electron beam heating technic -exam -Sputter deposition -Types of Sputtering -X-Ray Diffraction (XRD) - Atomic force microscope (AFM) -Scanning electron microsc (SEM) - Transmission elect microscope (TEM)		

11. Course Evaluation

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

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	----------
Main references (sources)	Handbook of Physical Vapor Deposition (PVD) Processing-Donald M. Mattox.
Recommended books and references (scientific journals, reports…)	Handbook of Thin Film Deposition 4th Edition Krishna Seshan Dominic
Electronic References, Websites	From internet

Course Description Form

1. Course Name
Elementary particles1
2. Course Code
PHY-412
3. Semester / Year
First Semester(2025-2024)
4. Description Preparation Date:
15-9-2024
5. Available Attendance Forms
Actual Attendance
6. Number of Credit Hours (Total) / Number of Units (Total)
(2 Theory)/2/3
7. Course administrator's name (mention all, if more than one name)
Name: Prof.Dr. Hadi Dwaich ALattabi **Email: alattabih@uowasit.edu.iq**
8. Course Objectives

Course Objectives	**Providing students with the basic**

	concepts of different elementary particles to help them develop their skills. 2. Enabling students to use these skills in their future field of work in addition to the fields of scientific research and practical experiments in a way that contributes to serving society and developing the reality of education in it.

9. Teaching and Learning Strategies

Strategy	**-Group discussions and assignments** **-Creating an atmosphere of competition among students and treating individual differences using appropriate educational methods.** **-Research groups - nested discussion circles.** **- Teaching methods include the use of educational technology.** **- Encouraging students to self-learn.**

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	(2 Th+1 Tu)		Elementary characteristics of quantum mechanics and the importance of quantum mechanics in physics	Theoretical	Daily preparation, daily and oral exams on the board and assignments
2	(2 Th+1 Tu)		Vector function and its interpretation	Theoretical	Daily preparation, daily and oral exams on the board and assignments
3	(2 Th+1		Derivation of	Theoretical	Daily

	Tu)		**Schödinger equation**		**preparation, daily and oral exams on the board and assignments**
4	**(2 Th+1 Tu)**		**Schödinger vector equation - effects**	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
5	**(2 Th+1 Tu)**		**Schödinger vector equation - effects**	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
6	**(2 Th+1 Tu)**		**Derivation of the vector equation for the hydrogen atom**	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
7	**(2 Th+1 Tu)**		**Deduce the Laplacian effects that affect a proton and an electron**	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
8	**(2 Th+1 Tu)**		**Mid-term Exam**		**written exams**
9	**(2 Th+1 Tu)**		**Standard functions**	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
10	**(2 Th+1 Tu)**		**Eigen values and eigen functions of position and momentum in the x-axis direction**	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
11	**(2 Th+1 Tu)**		**Eigen values and eigen functions of position and momentum in the x-**	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**

			axis direction		
12	(2 Th+1 Tu)		Expected values	Theoretical	Daily preparation, daily and oral exams on the board and assignments
13	(2 Th+1 Tu)		Eigenfunctions and constants of motion	Theoretical	Daily preparation, daily and oral exams on the board and assignments
14	(2 Th+1 Tu)		Results in quantum mechanics that correspond to fundamental results in classical mechanics	Theoretical	Daily preparation, daily and oral exams on the board and assignments
15	(3 h)		Results in quantum mechanics that correspond to fundamental results in classical mechanics	Theoretical	Daily preparation, daily and oral exams on the board and assignments

11. Course Evaluation

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

Course	Daily preparation, daily and oral exams	Daily assignments	Mid-term Exam	Final -Exam
2nd	15	15	10	60

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Elementary particles in physics by S Gasiorowicz
Main references (sources)	
Electronic References	Websites

Course Description Form

1. Course Name
Elementary particles2
2. Course Code
PHY-422
3. Semester / Year
Second Semester(2025-2024)
4. Description Preparation Date:
15-9-2024
5. Available Attendance Forms
Actual Attendance
6. Number of Credit Hours (Total) / Number of Units (Total)
(2 Theory)/2/3
7. Course administrator's name (mention all, if more than one name)
Name: Prof.Dr. Hadi Dwaich ALattabi **Email: alattabih@uowasit.edu.iq**
8. Course Objectives

Course Objectives	**Providing students with the basic**

	concepts of different elementary particles to help them develop their skills. 2. Enabling students to use these skills in their future field of work in addition to the fields of scientific research and practical experiments in a way that contributes to serving society and developing the reality of education in it.

9. Teaching and Learning Strategies

Strategy	**-Group discussions and assignments** **-Creating an atmosphere of competition among students and treating individual differences using appropriate educational methods.** **-Research groups - nested discussion circles.** **- Teaching methods include the use of educational technology.** **- Encouraging students to self-learn.**

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	(2 Th+1 Tu)		**Conservation of leptons**	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
2	(2 Th+1 Tu)		**Conservation of baryons**	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
3	(2 Th+1 Tu)		**Conservation of isotopic spin**	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
4	(2 Th+1 Tu)		**Conservation of strangeness**	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**

5	**(2 Th+1 Tu)**		**Conservation of parity**	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
6	**(2 Th+1 Tu)**		**Short-lived particles and the resonances**	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
7	**(2 Th+1 Tu)**		**Examples**	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
8	**(2 Th+1 Tu)**		**Mid-term Exam**		**written exams**
9	**(2 Th+1 Tu)**		**Composition of hydrons**	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
10	**(2 Th+1 Tu)**		**antiquark**	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
11	**(2 Th+1 Tu)**		**Quarks in pictures**	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
12	**(2 Th+1 Tu)**		**Composition of proton according to pictoquarks model**	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
13	**(2 Th+1 Tu)**		**Composition of neutron according to picto quarks model**	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
14	**(2 Th+1 Tu)**		**Solved problems 1**	**Theoretical**	**Daily preparation, daily and oral exams on the**

					board and assignments
15	**(3 h)**		**Solved problems 2**	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
16	**(3 h)**		**Solved problems 3**	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**

11. Course Evaluation

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

Course	Daily preparation, daily and oral exams	Daily assignments	Mid-term Exam	Final -Exam
2nd	**15**	**15**	**10**	**60**

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Elementary particles in physics by S Gasiorowicz
Main references (sources)	
Electronic References	Websites

Course Description Form

1. Course Name
Nuclear Physics1
2. Course Code
PHY-411
3. Semester / Year
First Semester(2025-2024)
4. Description Preparation Date:
15-9-2024
5. Available Attendance Forms
Actual Attendance
6. Number of Credit Hours (Total) / Number of Units (Total)
(2 Theory)/2/3
7. Course administrator's name (mention all, if more than one name)
Name: Prof.Dr. Hadi Dwaich ALattabi **Email: alattabih@uowasit.edu.iq**
8. Course Objectives

Course Objectives	**The course (Nuclear Physics) aims to teach the student the most important basic principles in terms**

	of theories, rules, and general laws in the specialty of nuclear physics, with theoretical and mathematical aspects that revolve around the nucleus in addition to the atom, to make the student have the ability to understand, perceive, and know within the six levels of thinking (Bloom) and enhancing his mental abilities, leading to the student's mental violence

9. Teaching and Learning Strategies

Strategy	**-Group discussions and assignments** **-Creating an atmosphere of competition among students and treating individual differences using appropriate educational methods.** **-Research groups - nested discussion circles.** **- Teaching methods include the use of educational technology.** **- Encouraging students to self-learn.**

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	**(2 Th+1 Tu)**		**Introduction to atomic and nuclear physics and solving examples of the theory of relativity Introduction to atomic and nuclear physics and solving examples of the theory of relativity**	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
2	**(2 Th+1 Tu)**		**Atom and nucleus**	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
3	**(2 Th+1 Tu)**		**Nuclear binding energy with applied examples**	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
4	**(2 Th+1 Tu)**		**Nuclear energy levels**	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
5	**(2 Th+1 Tu)**		**The energy associated with nuclear decay (gamma, alpha, beta)**	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
6	**(2 Th+1 Tu)**		**The energy associated with nuclear decay (gamma, alpha, beta)**	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
7	**(2 Th+1 Tu)**		**Electron-proton annihilation**	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
8	**(2 Th+1 Tu)**		Mid-term Exam		**written exams**

9	**(2 Th+1 Tu)**		**Law of radial decay**	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
10	**(2 Th+1 Tu)**		**Applications of specific effectiveness (SA), examples**	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
11	**(2 Th+1 Tu)**		**Nuclear reactions, general notes, movements of nuclear reactions**	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
12	**(2 Th+1 Tu)**		**Nuclear fission reaction**	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
13	**(2 Th+1 Tu)**		**Energy loss and radiation penetration through matter, Coulombic interactions**	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
14	**(2 Th+1 Tu)**		**Hysteresis rays**	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
15	**(3 h)**		**The stopping power arising from ionization and excitation of (p, d, t, α) particles**	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
16	**(3 h)**		**The stopping power of protons**	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**

11. Course Evaluation

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

Course	Daily preparation, daily and oral exams	Daily assignments	reports	Seminars	Mid-term Exam	Final -Exam
1st	**15**	**15**	**5**	**5**	**10**	**50**

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Mesurment and Detection of Radiation " McGRAW – Hill Tsou lfanidis (1995
Main references (sources)	Meyerhof's book (Introduction to Nuclear Physics). Author Anka's book (Fundamentals of Nuclear Physics)
Electronic References	Websites

Course Description Form

1. Course Name
Nuclear Physics2
2. Course Code
PHY-421
3. Semester / Year
Second Semester(2025-2024)
4. Description Preparation Date:
15-9-2024
5. Available Attendance Forms
Actual Attendance
6. Number of Credit Hours (Total) / Number of Units (Total)
(2 Theory)/2/3
7. Course administrator's name (mention all, if more than one name)
Name: Prof.Dr. Hadi Dwaich ALattabi **Email: alattabih@uowasit.edu.iq**
8. Course Objectives

Course Objectives	**The course (Nuclear Physics) aims to teach the student the most important basic principles in terms of theories, rules, and general laws in the specialty of nuclear physics, with theoretical and mathematical aspects that revolve around the nucleus in addition to the atom, to make the student have the ability to understand, perceive, and know within the six levels of thinking (Bloom) and enhancing his mental abilities, leading to the student's mental violence**

9. Teaching and Learning Strategies

Strategy	**-Group discussions and assignments** **-Creating an atmosphere of competition among students and treating individual differences using appropriate educational methods.** **-Research groups - nested discussion circles.** **- Teaching methods include the use of educational technology.** **- Encouraging students to self-learn.**

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	(2 Th+1 Tu)		**Stopping ability for deceleration rays**	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
2	(2 Th+1 Tu)		**Solve applied examples of the stopping power of different particles**	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
3	(2 Th+1 Tu)		**Range of charged**	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
4	(2 Th+1 Tu)		**particles, range of heavy particles**	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
5	(2 Th+1 Tu)		**The term for electrons and protons with solutions and applied examples**	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
6	(2 Th+1 Tu)		Heavy ion stopping ability (A>2, Z>2)	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
7	(2 Th+1 Tu)		**Range for heavy ions (A>2(**	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
8	(2 Th+1 Tu)		Mid-term Exam		**written exams**
9	(2 Th+1 Tu)		**Interactions of gamma rays and X-rays with matter**	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
10	(2 Th+1 Tu)		**Compton scattering, pair production,**	**Theoretical**	**Daily preparation, daily and oral exams on the**

			photoelectric phenomenon		board and assignments
11	(2 Th+1 Tu)		Total attenuation coefficient, photon energy absorption coefficient with practical examples	Theoretical	Daily preparation, daily and oral exams on the board and assignments
12	(2 Th+1 Tu)		Increasing factors, interaction of neutrons with matter, and solving applied examples	Theoretical	Daily preparation, daily and oral exams on the board and assignments
13	(2 Th+1 Tu)		Introduction to nuclear models, liquid drop model	Theoretical	Daily preparation, daily and oral exams on the board and assignments
14	(2 Th+1 Tu)		A brief overview of the peaceful use of nuclear energy	Theoretical	Daily preparation, daily and oral exams on the board and assignments
15	(3 h)		A brief overview of nanotechnology	Theoretical	Daily preparation, daily and oral exams on the board and assignments
16	(3 h)		A brief overview of nanotechnology	Theoretical	Daily preparation, daily and oral exams on the board and assignments

11. Course Evaluation

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

Course	Daily preparation, daily and oral exams	Daily assignments	reports	Seminars	Mid-term Exam	Final -Exam
2nd	15	15	5	5	10	50

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Mesurment and Detection of Radiation " McGRAW – Hill Tsou lfanidis (1995
Main references (sources)	Meyerhof's book (Introduction to Nuclear Physics). Author Anka's book (Fundamentals of Nuclear Physics)
Electronic References	Websites

Course Description Form

1. Course Name:
Electromagnetics-1
2. Course Code: /
PHY-413
3. Semester / Year: 4th stage
2025-2024 – 1ST Semester
4. Description Preparation Date:
15-9-2024
5. Available Attendance Forms:
Weekly
6. Number of Credit Hours (Total) / Number of Units (Total)
2/2
7. Course administrator's name (mention all, if more than one name)
Name: Prof. Dr. Hashim Ali Yusr **Email: hashim@uowasit.edu.iq**
8. Course Objectives

Course Objectives	• **Providing Students with knowledge of the principles of electromagnetic theory**

	• – Developing positive attitudes towards electromagnetic theory • – Identifying research methods in electromagnetic theory • – Identify the basic concepts in electromagnetic theory • – Identify the basic trends in electromagnetic theory • – Identifying the objectives of electromagnetic theory • – Forming Students' knowledge of the historical development of the concept electromagnetic theory • – Identify the components of the basic properties of electromagnetic theory • – Learn about the basic information of vector algebra and the basic laws vectors • – Acquire theoretical knowledge in the basic laws of electrostatics • – Identify the Poisson and Laplace equations • – Evaluating the performance characteristics of electromagnetic theory • – Acquiring skills in the topics of magnetic theory and its applications

9. Teaching and Learning Strategies

Strategy	- Method of Lecture, discussion and brainstorm - Teaching methods include the use of educational technology - Encouraging students to self-learn

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Knowledge and understanding the Vector analysis and vector algebra	Vector analysis vector algebra	Method of Lecture, discussion and brainstorm	QUIZ. and EXAM
2	2	Knowledge and understanding Gradient ,divergence ,curl	Gradient ,divergence ,curl	Method of Lecture, discussion and brainstorm	QUIZ. and EXAM
3	2	Knowledge and understanding Electrostatics :coulomb laws	Electrostatics :coulomb laws	Method of Lecture, discussion and brainstorm	QUIZ. and EXAM
4	2	Knowledge and understanding Electric field ,potential	Electric field ,potential	Method of Lecture, discussion and brainstorm	QUIZ. and EXAM
5	2	Knowledge and understanding	Conductors , insulators	Method of Lecture,	QUIZ. and EXAM

		Conductors , insulators		discussion and brainstorm	
6	2	Knowledge and understanding Gauss's law, electric dipole	Gauss's law, electric dipole	Method of Lecture, discussion and brainstorm	QUIZ. and EXAM
7	2	Knowledge and understanding Poisson's eq. ,Laplace eq.	Poisson's eq. ,Laplace eq.	Method of Lecture, discussion and brainstorm	QUIZ. and EXAM
8	2	Knowledge and understanding Uniqueness theorem	Uniqueness theorem	Method of Lecture, discussion and brainstorm	QUIZ. and EXAM
9	2	Knowledge and understanding Method of image	Method of image	Method of Lecture, discussion and brainstorm	QUIZ. and EXAM
10	2	Knowledge and understanding Resistance and capacitance	Resistance and capacitance	Method of Lecture, discussion and brainstorm	QUIZ. and EXAM
11	2	Knowledge and understanding Electrostatics field in dielectric	Electrostatics field in dielectric	Method of Lecture, discussion and brainstorm	QUIZ. and EXAM
12	2	Knowledge and understanding Electrostatics energy	Electrostatics energy	Method of Lecture, discussion and brainstorm	QUIZ. and EXAM
13	2	Knowledge and understanding Energy density ,	Energy density ,	Method of Lecture, discussion and brainstorm	QUIZ. and EXAM
14	2	Knowledge and understanding Convection and conduction current	Convection and conduction current	Method of Lecture, discussion and brainstorm	QUIZ. and EXAM
15	2	Knowledge and understanding Current density ,eq. of continuity	Current density ,eq. of continuity	Method of Lecture, discussion and brainstorm	QUIZ. and EXAM
16	2	Exam	Exam		

11. Course Evaluation

7. Follow up daily attendance.
8. Daily Quiz
9. Monthly Exam
10. Final exam
11. grades for participation to solve questions during the lecture

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Foundations of Electromagnetic

	Theory (4th Edition) By John R. Reitz, Frederick J. Milford
Main references (sources)	
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

Course Description Form

1. Course Name:	
Electromagnetics-2	
2. Course Code: /	
PHY-423	
3. Semester / Year:	
2025-2024 – 2ND Semester	
4. Description Preparation Date:	
15-9-2024	
5. Available Attendance Forms:	
Weekly	
6. Number of Credit Hours (Total) / Number of Units (Total)	
2/2	
7. Course administrator's name (mention all, if more than one name)	
Name: Prof. Dr. Hashim Ali Yusr **Email: hashim@uowasit.edu.iq**	
8. Course Objectives	
Course Objectives	• **Providing Students with knowledge of the principles of electromagnetic theory**

	• – Developing positive attitudes towards electromagnetic theory • – Identifying research methods in electromagnetic theory • – Identify the basic concepts in electromagnetic theory • – Identify the basic trends in electromagnetic theory • – Identifying the objectives of electromagnetic theory • – Forming Students' knowledge of the historical development of the concept electromagnetic theory • – Identify the components of the basic properties of electromagnetic theory • – Identify the basic information about magnetism • – Acquiring theoretical knowledge in the basic laws of the magnetic field • – Identify the Biot–Savart equations and Ampere's law • – Learn about Maxwell's equations in electromagnetism • – Acquiring skills in the topics of magnetic theory and its applications

9. Teaching and Learning Strategies

Strategy	- Method of Lecture, discussion and brainstorm - Teaching methods include the use of educational technology - Encouraging students to self-learn

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Knowledge and understanding Magnetic field of steady current	Magnetic field of steady current	Method of Lecture, discussion and brainstorm	QUIZ. and EXAM
2	2	Knowledge and understanding Biot & savart law	Biot & savart law	Method of Lecture, discussion and brainstorm	QUIZ. and EXAM
3	2	Knowledge and understanding Ampere law	Ampere law	Method of Lecture, discussion and brainstorm	QUIZ. and EXAM
4	2	Knowledge and understanding Magnetic scalar	Magnetic scalar	Method of Lecture, discussion and brainstorm	QUIZ. and EXAM
5	2	Knowledge and understanding vector potential	vector potential	Method of Lecture, discussion and brainstorm	QUIZ. and EXAM
6	2	Knowledge and understanding Magnetic torque and	Magnetic torque and moment	Method of Lecture, discussion and brainstorm	QUIZ. and EXAM

		moment			
7	2	Knowledge and understanding Magnetic dipole	Magnetic dipole	Method of Lecture, discussion and brainstorm	QUIZ. and EXAM
8	2	Knowledge and understanding magnetization in materials	magnetization in materials	Method of Lecture, discussion and brainstorm	QUIZ. and EXAM
9	2	Knowledge and understanding Classification of magnetic materials	Classification of magnetic materials	Method of Lecture, discussion and brainstorm	QUIZ. and EXAM
10	2	Knowledge and understanding Magnetic boundary condition	Magnetic boundary condition	Method of Lecture, discussion and brainstorm	QUIZ. and EXAM
11	2	Knowledge and understanding Magnetic energy	Magnetic energy	Method of Lecture, discussion and brainstorm	QUIZ. and EXAM
12	2	Knowledge and understanding energy density	energy density	Method of Lecture, discussion and brainstorm	QUIZ. and EXAM
13	2	Knowledge and understanding Forces on magnetic materials	Forces on magnetic materials	Method of Lecture, discussion and brainstorm	QUIZ. and EXAM
14	2	Knowledge and understanding Hysteresis loss	Hysteresis loss	Method of Lecture, discussion and brainstorm	QUIZ. and EXAM
15	2	Knowledge and understanding Maxwell's eqs.	Maxwell's eqs.	Method of Lecture, discussion and brainstorm	QUIZ. and EXAM
16	2	Exam	Exam		

11. Course Evaluation

13. Follow up daily attendance.
14. Daily Quiz
15. Monthly Exam
16. Final exam
17. grades for participation to solve questions during the lecture

18. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Foundations of Electromagnetic Theory (4th Edition) By John R. Reitz, Frederick J. Milford
Main references (sources)	
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

Course Description Form

1. Course Name: Mathematical physics 1
2. Course Code PHY-414
3. Semester / Year
first Semester(2025−2024)/4th stage /general
4. Description Preparation Date:.
15−9−2024
5. Available Attendance Forms
Actual Attendance
6. Number of Credit Hours (Total) / Number of Units (Total)
2 / 2 units
7. Course administrator's name (mention all, if more than one name)
Name:D.r Faiq Jameel Hassan Email: @uowasit.edu.iq
8. Course Objectives

Course Objectives	**- It makes the student familiar and aware of the most important characteristics of the**

	course. **- Enabling the student to understand the concept of special functions** **- Enabling the student to understand the concept of the Bessel equation and how to solve it** **- Enabling the student to understand the concept of the gender equation and how to solve it** **- Enabling the student to understand the concept of Laplace transforms** **- Enabling the student to understand the concept of inverse Laplace transforms and solve equations**

9. Teaching and Learning Strategies

Strategy	Group discussions and assignments Creating an atmosphere of competition among students and treating individual differences using appropriate educational methods Research groups - nested discussion circles. - Teaching methods include the use of educational technology - Encouraging students to self-learn.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	(2 **Th)**	Gamma and Error functions and Beta function	Special Function	**Deliverance - discussion**	**General questions and discussion**
2	(2 **Th)**	Gamma and Error functions and Beta function	Special Function	**Deliverance - discussion**	**General questions and discussion**
3	(2 **Th)**	Solution of Bessel's differential equation	Bessel's differential equation	**Deliverance - discussion**	**General questions and discussion**
4	(2 **Th)**	Solution of Bessel's differential equation	Bessel's differential equation	**Deliverance - discussion**	**General questions and discussion**
5	(2 **Th)**	Solution of Bessel's differential equation	Bessel's differential equation	**Deliverance - discussion**	**General questions and discussion**
6	(2 **Th)**	Legendre's polynomials and generating function and Legendre's differen	Legendre's differential equation	**Deliverance - discussion**	**General questions and discussion**

		equation. Rodrigues formula and recursive relations			
7	(2 **Th)**	Legendre's polynomials and generating function and Legendre's differen equation. Rodrigues formula and recursive relations	Legendre's differential equation	**Deliverance - discussion**	**General questions and discussion**
8	(2 **Th)**	Laplace transform	Laplace transform		**General questions and discussion**
9	(2 **Th)**	Laplace transform	Laplace transform	**Deliverance - discussion**	**General questions and discussion**
10	(2 **Th)**	Laplace transform	Laplace transform	**Deliverance - discussion**	**General questions and discussion**
11	(2 **Th)**	Laplace transform	Laplace transform	**Deliverance - discussion**	**General questions and discussion**
12	(2 **Th)**	Inverse Laplace transfor	Laplace transform	**Deliverance - discussion**	**General questions and discussion**
13	(2 **Th)**	Inverse Laplace transfor	Laplace transform	**Deliverance - discussion**	General questions and discussion
14	(2 **Th)**	Inverse Laplace transfor	Laplace transform	**Deliverance - discussion**	General questions and discussion
15	(2 **h)**	Inverse Laplace transfor	Laplace transform	**Deliverance - discussion**	**General questions and discussion**
16	(2h)		**Second Exam**		

11. Course Evaluation

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

Course	Daily preparation, daily and oral exams	Daily assignments	reports	Seminars	Mid-term Exam	Final -Exam
1st	15	15	5	5	10	50

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	G Farkhad, Mathematical Methods for Physics: Problems and Solutions, 2023
Main references (sources)	Arfekn, Mathematical Methods for Physicists 7e.

Recommended books and references (scientific journals, reports…)	H. J. Weber and G. B. Arfken, "Essential Mathematical Methods for Physicists", Academic Press, 2003.
Electronic References, Websites	Methods in Applied Mathematics authored by Dr. Basil Yaqoub Youssef, University of Basra – Iraq,9191. ‹

Course Description Form

1. Course Name Mathematical physics 2
2. Course Code PHY-423
3. Semester / Year
second Semester(2025-2024) /4th stage /general
4. Description Preparation Date:.
29/2/2024
5. Available Attendance Forms
Actual Attendance
6. Number of Credit Hours (Total) / Number of Units (Total)
2 / 2 units
7. Course administrator's name (mention all, if more than one name)
Name:D.r Faiq Jameel Hassan Email: @uowasit.edu.iq

8. Course Objectives

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

9. Teaching and Learning Strategies

Strategy	Group discussions and assignments Creating an atmosphere of competition among students and treating individual differences using appropriate educational methods Research groups - nested discussion circles. - Teaching methods include the use of educational technology - Encouraging students to self-learn.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	(2 **Th)**	Curvilinear coordinate systems Gradient, Divergence, Curl and Laplacian in orthogonal Curvilinear coordinate	Vector Calculus	**Deliverance - discussion**	**General questions and discussion**
2	(2 **Th)**	Curvilinear coordinate systems Gradient, Divergence, Curl and Laplacian in orthogonal Curvilinear coordinate	Vector Calculus	**Deliverance - discussion**	**General questions and discussion**
3	(2 **Th)**	Special coordinate syste Rectangular Cartesian coordinate	coordinate systems	**Deliverance - discussion**	**General questions and discussion**
4	(2 **Th)**	Special coordinate syste Rectangular Cartesian coordinate	coordinate systems	**Deliverance - discussion**	**General questions and discussion**
5	(2 **Th)**	Special coordinate syste	coordinate systems	**Deliverance -**	**General questions and discussion**

		Rectangular Cartesian coordinate		**discussion**	
6	(2 **Th)**	Complex Numbers Arga diagram	Complex Numbers	**Deliverance - discussion**	**General questions and discussion**
7	(2 **Th)**	Complex Numbers Arga diagram	Complex Numbers	**Deliverance - discussion**	**General questions and discussion**
8	(2 **Th)**	Functions of a Complex variable Analytic Functi	Functions of a Complex variable		**General questions and discussion**
9	(2 **Th)**	Functions of a Complex variable Analytic Functi	Functions of a Complex variable	**Deliverance - discussion**	**General questions and discussion**
10	(2 **Th)**	Functions of a Complex variable Analytic Functi	Functions of a Complex variable	**Deliverance - discussion**	**General questions and discussion**
11	(2 **Th)**	Functions of a Complex variable Analytic Functi	Functions of a Complex variable	**Deliverance - discussion**	**General questions and discussion**
12	(2 **Th)**	Laurent theorem Singul point The residue theor Periodic functions Fouri Series	Laurent theorem Singular point The residue theorem Periodic functions Fourier Series	**Deliverance - discussion**	**General questions and discussion**
13	(2 **Th)**	Laurent theorem Singul point The residue theor Periodic functions Fouri Series	Laurent theorem Singular point The residue theorem Periodic functions Fourier Series	**Deliverance - discussion**	General questions and discussion
14	(2 **Th)**	Laurent theorem Singul point The residue theor Periodic functions Fouri Series	Laurent theorem Singular point The residue theorem Periodic functions Fourier Series	**Deliverance - discussion**	General questions and discussion
15	(2 **h)**	Laurent theorem Singul point The residue theor Periodic functions Fouri Series	Laurent theorem Singular point The residue theorem Periodic functions Fourier Series	**Deliverance - discussion**	**General questions and discussion**
16	(2h)		**Second Exam**		
11. Course Evaluation					

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

Course	Daily preparation, daily and oral exams	Daily assignments	reports	Seminars	Mid-term Exam	Final -Exam
2st	15	15	5	5	10	50

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	G Farkhad, Mathematical Methods for Physics: Problems and Solutions, 2023
Main references (sources)	Arfekn, Mathematical Methods for Physicists 7e.
Recommended books and references (scientific journals, reports…)	H. J. Weber and G. B. Arfken, "Essential Mathematical Methods for Physicists", Academic Press, 2003.
Electronic References, Websites	Methods in Applied Mathematics authored by Dr. Basil Yaqoub Youssef, University of Basra – Iraq,9191.

Course Description Form

1. Course Name:
Philosophy of Science and Scientific Research Method
2. Course Code:
PHY−424
3. Semester / Year:
Two Semesters / fourth stage/ 2024−2025
4. Description Preparation Date:
15−9−2024
5. Available Attendance Forms:
Presence
6. Number of Credit Hours (Total) / Number of Units (Total)
(2h theoretical) & (2Units)

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

Name: Dr. Firas Mohammed Dashour Email: @faljaafari@uowasit.edu.iq

8. Course Objectives

Course Objectives	• **Study and knowledge of philosophy and its types and link it to science.** • **Learn about the research methodology and how to write the research correctly.** • **Recognize how a scientist can be a philosopher and a philosopher a scientist.** • **– Identify the most important types of philosophy and research** • **– Promoting scientific research, especially master's research and PhD.**

9. Teaching and Learning Strategies

Strategy	

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 1 2 3 4	30 hours 30 hours	**First Semester** 1. Learn about philosophy and its types 2. Learn about science and knowledge and how 3. to obtain them. 4. Learn about the relationship between science 5. and philosophy. 6. Ability to reasonably philosophical thinking 7. Understanding the philosophy of science . 8. Knowledge of scientific research and its types. 9. Realizing how science has evolved. 10. Knowing the reason for the completion of 11. scientific research. 12. Determine the importance of research 13. Highlighting the most important characteristics scientific research. 14. Knowledge of the different fields of scientific research 15. Learning what are the things that must be provided to do scientific research. **Second Semester** 1. Extensive study to know the caveats of scientific research. 2. Learn about the scientific research methodology. 3. Distinguish the most important characteristics of scientific research. 4. Determine the most important criteria for classifying scientific research methods.	- 1 .The cardiovascular system, structural organization and properties 2 The cardiac cycle 3 Heart as a pump and cardiac functions 4 Pulse wave propagati 5 Flow patterns in complex internal geome 6 Wall dynamics in infinitesimal and finite displacement 7 Modeling of three-dimensional flow 8 Ventricle fluid dynam 9 Pathological condition and valve dynamics 10 Local blood flow in arteries 11 Newtonian and non-Newtonian flow 12 Navier Stokes equations 13 Mass transport in arteries 14 Artery wall properti 15 An overview of I and applications	Presence	-Theoretic exam -oral exam -Reports

5 6 7 8 9 10 11 12 13 14 15		5. Knowledge of the historical method of scientific research 6. Identify and understand what the descriptive approach is 7. Knowledge of the experimental method 8. A good study of the stages of preparing th research 9. Sweating on the most important and safes and most accurate methods in data collection. 10. Means of collecting information. 11. Statistical Methods. 12. View Results . 13. Analysis and discussion of results 14. Conclusions. 15. Recommendations.			

16. Course Evaluation

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

17. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Kamal Dashli (2016), Scientific Research Methodolog Hama University Publications, Faculty of Economics, Directorate of University Books and Publications.
Main references (sources)	Aqeel Hussein Aqeel (1999) Philosophy of Scient Research Methods, Madbouly Library.
Recommended books and references (scientific journals, reports…)	
Spectra References, Websites	Internet sites specialized in teaching and explain philosophy

Course Description Form

1. Course Name
English language
2. Course Code
PHY-417
3. Semester / Year
Second Semester(2025-2024)
4. Description Preparation Date:
15-9-2024
5. Available Attendance Forms

Actual Attendance

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

2(Hours) Theory /2

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

Name: Lecturer Assistant **Imad Kamil Zayer**
Email: ealrobeiy@uowasit.edu.iq

8. Course Objectives

Course Objectives	**1. Empowering students to write essays and texts in English.** **2. Improving students' comprehension and overall language skills.** **3. Preparing students academically, professionally, and culturally.** **4. Enabling students to use modern technology to understand course material.** **5. Enabling students to understand the specific ethical values of scientific research.** **6. Developing students' research skills and linking them to the job market.** **7. Developing students' academic writing skills.** **8. Preparing students for the national exam / IELTS.**

9. Teaching and Learning Strategies

Strategy	**-Group discussions and assignments** **-Creating an atmosphere of competition among students and treating individual differences using appropriate educational methods.** **-Research groups - nested discussion circles.** **- Teaching methods include the use of educational technology.** **- Encouraging students to self-learn.**

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2 **Theo.**		Tenses system:Simple, Continuous , perfect	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
2	2 Theo.		Vocabulary: Compound word lifestyle, home town, house-proud/	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**

			Social expressions(Great to see you , Don't to see you from somewhere).		
3	2 Theo.		Reading: Two people describe their experiences of living abroad.	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
4	2 Theo.		Active and passive, informal language	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
5	2 Theo.		Speaking: Exchanging information about people who live abroad.	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
6	2 Theo.		Listening: Things I miss from home(people describe what they miss when they travel abroad)	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
7	2 Theo.		Tenses system: Present Perfect. Hot verbs: make ,do make way, do damage	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
8	2 Theo.		Mid-term Exam		**written exams**
9	2 Theo.		Speaking English: Being imprecise Reading: Paradise lost	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
10	2 Theo.		Narrative tenses: Simple, Past Continuous Vocabulary: Books and films Substitutions	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
11	2 Theo.		Narrative tenses: Past perfect Speaking: Retelling a news story Writing: Appling for job	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
12	2 Theo.		Everyday English: Making your point. Writing Describing paces	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
13	2 Theo.		Modal auxiliary verbs: could have been,might have been, sould have been Report: The managing Director.	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
14	2 Theo.		Articles: a/an, the. Listening: A teacher I'll never forget- people describe their experiences in extreme weather		**Daily preparation, daily and oral exams on the board and assignments**

			conditions		
15	**2 Theo.**		**review**	**review**	**reports**
16	2 Theo.		**The preparatory week before the Final Exam**	**The preparatory week before the Final Exam**	

11. Course Evaluation

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

Course	Daily preparation, daily and oral exams	Daily assignments	reports	Seminars	Mid-term Exam	Final -Exam
2nd	**5**	**5**	**5**	**5**	**20**	**40**

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	
Main references (sources)	**Headway Plus Book/ Liz and John Soars**
Recommended books and references (scientific journals, reports…)	**Check your English vocabulary for IELTS/ Rawdon Wyatt**

Practical

Course Description Form

1. Course Name:
Nuclear Physics1 - Practical
2. Course Code:
PHY−411
3. Semester / Year: 4th stage
First semester / 2025−2024
4. Description Preparation Date:
15−9−2024
5. Available Attendance Forms:
Attendance / Biannual
6. Number of Credit Hours (Total) / Number of Units (Total)
2 / 2/3

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

Name: - Prof. Dr. Hadi D. Z.
- Prof. Mohamed Jebur Resen

Email: maldhuhaibat@uowasit.edu.iq

8. Course Objectives

Course Objectives	• Enabling the student to deal with radioactive sources • The student's knowledge of comparing the results obtained practically with theoretical results • Identify some of the characteristics of nuclear radiation, ways to block it, and ways to reduce doses • Analyze data and discuss results

9. Teaching and Learning Strategies

Strategy	• The ability to logically analyze experimental results • The ability to identify the factors affecting the achievement of the Alara principle • Ability to draw and discuss results

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Referred to in the previous axis, each according to the content	Concepts of occupational safety and laboratory work	Practical application	Written tests
2	2	=	**Operating Potential of Geiger-Muller Tube**	Practical application	Written tests
3	2	=	**Range of α- particles in the air**	Practical application	Written tests
4	2	=	**Mean range of β- particles in air**	Practical application	Written tests
5	2	=	• **The quantum flux of γ-radiation in air**	Practical application	Written tests
6	2	=	**Mid-term exam**	Practical application	Written tests
7	2	=	**Attenuation Properties of γ-Rays as a Function of Material Density**	Practical application	Written tests
8	2	=	**Attenuation Coefficient of Gamma-Rays in Copper**	Practical application	Written tests
9	2	=	**Geiger Counter**	Practical	Written tests

			Efficiency for Gamma Ray	application	
10	**2**	=	**Dose meter and Proving Inverse Square Law**	Practical application	Written tests
11	**2**	=	**Mid-term exam**	Practical application	Written tests
12	**2**	=	**Review and audit**		

11. Course Evaluation

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

Monthly exams	daily and oral exams	project or report	Experimental exams	Final exam
20	5	3	12	60 (40 theoretical +20 experimental)

12. Learning and Teaching Resources

Required textbooks (curricular books, if any	
Main references (sources)	Introduction to Nuclear and Particle Physics (Second Edition; A. Das & T. Ferbel)
Recommended books and references (scientific journals, reports…)	PHYWE SYSTEME GMBH · Robert−Bosch−Breite 10 · D−37079 · Göttingen ·
Electronic References, Websites	

Course Description Form

1. Course Name:
Nuclear Physics2 - Practical
2. Course Code:
PHY−421
3. Semester / Year:
Second semester / 2025−2024
4. Description Preparation Date:
15−9−2024
5. Available Attendance Forms:
Attendance / Biannual

6. Number of Credit Hours (Total) / Number of Units (Total)
2 / 2 /3

7. Course administrator's name (mention all, if more than one name)
Name: - Prof. Dr. Hadi D. Z. - Prof. Mohamed Jebur Resen Email: maldhuhaibat@uowasit.edu.iq

8. Course Objectives	
Course Objectives	• Enabling the student to deal with radioactive sources • The student's knowledge of comparing the results obtained practically with theoretical results • Identify some of the characteristics of nuclear radiation, ways to block it, and ways to reduce doses • Analyze data and discuss results

9. Teaching and Learning Strategies	
Strategy	• The ability to logically analyze experimental results • The ability to identify the factors affecting the achievement of the Alara principle • Ability to draw and discuss results

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Referred to in the previous axis, each according to the content	Concepts of occupational safety and laboratory work	Practical application	Written tests
2	2	=	**Attenuation Coefficient of Gamma-Rays in Copper**	Practical application	Written tests
3	2	=	**Planck`s constant and the photoelectric effect**	Practical application	Written tests
4	2	=	**Law of Radioactive decay**	Practical application	Written tests
5	2	=	• **Half-Life and Radioactive Equilibrium**	Practical application	Written tests
6	2	=	**Mid-term exam**	Practical application	Written tests
7	2	=	**Measure of Buildup Factor for Two-Layers Shields**	Practical application	Written tests
8	2	=	**Statistical variance**	Practical	Written tests

			and Gauss distribution	application	
9	**2**	=	**Differential Spectrum Analysis of Gamma Radiations**	Practical application	Written tests
10	**2**	=	**Back Scattering Factor of γ-Rays in Matter**	Practical application	Written tests
11	**2**	=	**Mid-term exam**	Practical application	Written tests
12	**2**	=	**Review and audit**		

11. Course Evaluation

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

Monthly exams	daily and oral exams	project or report	Experimental exams	Final exam
20	5	3	12	60 (40 theoretical +20 experimental)

12. Learning and Teaching Resources

Required textbooks (curricular books, if any	
Main references (sources)	Introduction to Nuclear and Particle Physics (Second Edition; A. Das & T. Ferbel)
Recommended books and references (scientific journals, reports…)	PHYWE SYSTEME GMBH · Robert−Bosch−Breite 10 · D−37079 · Göttingen ·
Electronic References, Websites	

Course Description Form

1. Course Name:
Solid State Physics
2. Course Code: PHY-412
3. Semester / Year: 4th stage
2025 − 2024
4. Description Preparation Date:
15−9−2024

5. Available Attendance Forms:

Presence

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

2/2/(3 Units)

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

Name: Ahmed Jadah Farhan

Email:aalomairi@uowasit.edu.iq

8. Course Objectives

Course Objectives	• **Preparing students scientifically, professionally and culturally and enabling them to know scientific facts, concepts and theories.** * **Enabling students to apply scientific methods in addressing life and professional problems and situations.** * **Enabling the graduate to continue his higher studies and absorb the novelties and developments in the field physics Sciences.** * **Helping students to acquire useful trends and values in line with the Arabic authenticity and the principles of the Islamic religion** **And other heavenly religions .** * **Developing the trends and inclinations of students and developing their abilities to face current and future challenges.** * **Development and development of ethical trends and values of scientific research**

9. Teaching and Learning Strategies

Strategy	* Students should be able to adopt scientific thinking methods in the face of problems * Adoption of systematic methods of thinking in harmony with the form and content of available knowledge * Employ cognitive skills in nature * Adopting in-depth learning methods that guarantee understanding and application * Provide learners with

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name SSP (semester #1 and #2)	Learning method	Evaluation method
1 2 3 4 5 6 7 8 9 10	30		**Semester #1** • **Crystal lattices and the seven crystal systems** • **Studying the cubic lattices** • **The Simple Cubic Crystal Structure:** • **The Face-Centered Cubic Crystal Structure:** • **The Body-Centered Cubic Crystal Structure:** • **The volume of a primitive unit cell.** • **Number of atoms per unit cell.** • **Atomic Packing Factor (APF)**	Presence	

11 12 13 14 15 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15			• **A:Diamond structure** • **B:Cubic Zinc Sulfide Structure(ZnS)** • **A:Sodium chloride structure(NaCl)** • **B: Cesium chloride structure (CsCl)** • **Hexagonal close-packed structure(hcp)** • **Directions and planes in crystals: Miller indices** • **Crystallographic directions** **Semester #2** • Analysis of X-ray Spectrum and a achieve Bragg's Law • Using X-ray to Knowledge properties of unknown crystal structure • Find the distances between atoms for (NaCl) crystal • Calculation Plank´s constant • The relationship between intensity of x-ray and anode each of voltage and current		

11. Course Evaluation

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

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Solid state physics , kittle,8th, 2008
Main references (sources)	Solid state physics , kittle,8th, 2008
Recommended books and references (scientific journals, reports…)	Solis state physics, Blakmore
Electronic References, Websites	From internet

The medical forth stage

Theortical:

Course Description Form

1. Course Name
Biomaterials
2. Course Code
PHY-325
3. Semester / Year: Second Semester(2023-2024)
Second Semester(2025-2024)
4. Description Preparation Date
15-9-2024
5. Available Attendance Forms
Actual Attendance

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

(2 Theory)/2/3

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

Name: Prof.Dr. Najwa Jassim Jubier
Email: njassim@uowasit.edu.iq

8. Course Objectives

Course Objectives	**To provide learners with knowledge of the principles of biomedical materials and to develop positive attitudes and understanding that biomaterials play an essential role in medicine today, restoring function and facilitating recovery for people after injury or illness. Biomaterials may be natural or synthetic and used in medical applications to support, enhance or replace damaged tissue or biological function. .** **Identify the basic concepts of medical materials.** **Learn how to select a biomaterial and its suitability for applications.** **Identifying polymeric and ceramic medical materials, metals and their alloys.** **Identify its uses and applications and study its physical, chemical, thermal and mechanical properties.**

9. Teaching and Learning Strategies

Strategy	**- Method of presentation, live interrogation and discussion - research groups overlapping discussion circles.** **- Teaching methods include the use of educational technology** **- Encouraging students to self-learn.**

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	(2Th)		Introduction about bio material	Theoretical	Daily preparation, daily and oral exams
2	(2Th)		Term Definitions, potential biomedical applications	Theoretical	Daily preparation, daily and oral exams
3	(2Th)		Fields of Knowledge to Develop Biomaterials, Uses of Biomaterials:	Theoretical	Daily preparation, daily and oral exams
4	(2Th)		Biomaterial in organs, Material for use in the body	Theoretical	Daily preparation, daily and oral exams
5	(2Th)		Selection of Biomedical Materials, Classes of	Theoretical	Daily preparation, daily and oral exams

			materials		
6	**(2Th)**		**Subjects are Important to Biomaterials Science**	**Theoretical**	**Daily preparation, daily and oral exams**
7	**(2Th)**		**The biomaterials properties,Physical Properties, Mechanical Properties of Biomaterials**	**Theoretical**	**Daily preparation, daily and oral exams**
8	**(2Th)**		**Monthly Exams 1**		**Daily preparation, daily and oral exams**
9	**(2Th)**		**Thermal Properties, Thermal Diffusivity, Coefficient of Thermal Expansion**	**Theoretical**	**Daily preparation, daily and oral exams**
10	**(2Th)**		**Chemical Properties**	**Theoretical**	**Daily preparation, daily and oral exams**
11	**(2Th)**		**Bio-ceramics, Types of Bio-ceramics – Tissue Attachment, Nearly Inert Crystalline Bioceramics**	**Theoretical**	**Daily preparation, daily and oral exams**
12	**(2Th)**		**Porous Ceramics, Bioactive Glasses and Glass-Ceramics, Resorbable Ceramics**	**Theoretical**	**Daily preparation, daily and oral exams**
13	**(2Th)**		**Composites and Coatings, Natural Composites, Hard Tissues, Synthetic Bone Grafting Materials**.	**Theoretical**	**Daily preparation, daily and oral exams**
14	**(2Th)**		**Polymer as Biomaterial Applications in biomedical field,**	**Theoretical**	**Daily preparation, daily and oral exams**
15	**(2Th)**		**Monthly Exams 2**		
16	**(2Th)**		**Denture Base Resins, General Techniques, Properties of Denture Base** Resin, **Natural Polymers, Metals and Alloys**		**report**

11. Course Evaluation

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

Courses	Daily preparation, daily and oral exams	reports	Monthly-Exam	Final -Exam
2nd	**5**	**5**	**30**	**60**

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	
Main references (sources)	**1-Materials for Biomedical Engineering, Alina-Maria Holban, Alexandru Mihai Grumezescu,** **2- Fundamental Biomaterials: Ceramics, *Sabu Thomas,Preet Balakrishnan,M.S. Sreekala***

Recommended books and references (scientific journals, reports…)	**1-Biomedical Applications of Polymeric Materials and Composites *Edited byRaju Francis andD. Sakthi Kumar*** **2- Biomedical Materials, Roger Narayan, Second Edition.** **3- Nanobiomaterials in Hard Tissue Engineering Applicati of Nanobiomaterials, Alexandru Mihai Grumezescu**
Electronic References, Websites	

Course Description Form

1. Course Name:
Magnetic Resonance Imaging (MRI)
2. Course Code:
PHY-422
3. Semester / Year:
2025-2024 / 4th medical stage
4. Description Preparation Date:
15-9-2024
5. Available Attendance Forms:
6. Number of Credit Hours (Total) / Number of Units (Total)
2/ 2
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Manal Jabbar Khalifa

Email: mjabbar@uowasit.edu.iq

8. Course Objectives

Course Objectives	1.This course provides the basics of MRI physics and the components of the imaging equipment used through lectures and seminars. 2. The course presents the theories and physical principles of resonance imaging, the main components of MRI devices, imaging factors and their effect in improving image quality, along with the main pulse sequences used in imaging and their applications with an emphasis on safety considerations, data acquisition mechanisms, 3. The course explains how to proc images, and techniques for recomposing th and displaying them.

9. Teaching and Learning Strategies

Strategy	1. Interactive Lectures: Use lectures to present basic and complex concepts related to MRI, encouraging students to ask questions and participate in discussions. 2.Assessment and Feedback: Continuously assess students through tests, reports, and presentations, providing constructive feedback that helps improve the learning process. 3.Self-learning and Research: Encourage students to conduct self-research and explore the latest developments in the field of MRI, helping develop research skills and a continuous learning habit.

10. Course Structure

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

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	Choosing Appropriate Technical Parameters: Students must learn how to choose the appropriate technical parameters for conducting MRI examinations in clinical practice. This includes understanding how these parameters affect image quality and the information that can be obtained from the examination	Fundamentals of Magnetic Resonance Principle of MRI Main Components of a Scanner Types of MRI Scanner Advantages & Disadvantages of MRI (T1 and T2) Contrast T1, T2 and PD weighted imaging Spatial encoding in MRI 3D spatial encoding K-space in MRI Fourier's Transform The field of view (FOV) MRI Artifacts MRI Safety Safety Checklist Final Exam		

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student :
Daily preparation 4
Quiz 3
Seminars 3
Monthly Exam 30
Final Exam 60

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	
Main references (sources)	**MRI in Practice(2nd edition)**
Recommended books and references (scientific journals, reports…)	**handbook-of-mri-technique mri-physics**
Electronic References, Websites	**Radiology web site**

Course Description Form

1. Course Name:
Biophysics
2. Course Code:
PHY−413
3. Semester / Year:
2025−2024 /4th medical stage
4. Description Preparation Date:
15−9−2024
5. Available Attendance Forms:
5. Available
6. Number of Credit Hours (Total) / Number of Units (Total):

2/2

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

Name: Dr.Zeina Abbass Salman
Email: zsalman@uowasit.edu.iq

8. Course Objectives

Course Objectives	• **Provide basic understanding of the key concepts of biophysics through the application of physical principles, methods, and techniques.** • **Focus on making students able to identify physical laws and their role in biophysical phenomena and life.** • **Enable students to solve problems covering applications of physics in biological systems.** • **Enable students to use this information in their future fields of work, such as the fields of scientific research and practical experiences, in a way that contributes to serving society and developing the reality of education in it.**

9. Teaching and Learning Strategies

Strategy	• **Using presentation, participation, problem solving, and discussion.** • **Using modern technology for education and encouraging students to participate in group discussions.** • **Encouraging students to self-learn and form groups to discuss scientific material.**

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Understanding the biological structures	Introduction to Biological Structures	Lecture+ Discussion	Exams
2	2	Knowing and being able to define the structures and formation of biomolecules	Structures and formation of Biomolecules	=	=
3	2	Knowing the molecular structure of membranes	Molecular Structure of Membranes	Lecture	=
4	2	Understanding the fundamental concepts of thermodynamics	Fundamental Concepts of Thermodynamics	Lecture+ Discussion	=
5	2	Define the structure and	Cell Structure and	=	=

		function of cells	Functions		
6	2	Understanding the electrostatic fields in cells	Electrostatic Fields and Cells	Lecture	=
7	2	Understanding the self-assembly and stability in biological systems	Self-Assembly and Stability	=	=
8	2	Knowing DNA and its functions	DNA and its Functions	=	=
9	2	Understanding proteins and protein folding	Protein and Protein Folding	Lecture+ Discussion	=
10	2	Knowing and understanding Brownian motion of biomolecules	Brownian motion	=	=
11	2	Defining fluids and understanding their properties	Basic Properties of Fluids	=	=
12	2	Understanding the viscosity of biological fluids	Viscosity of Biological Fluids	=	=
13	2	Knowing the biomechanics of fluid behavior	Biomechanics of Fluid Behavior	=	=
14	2	Understanding the effects of electric fields on the motion of biomolecules	Electrophoresis	=	=
15	2	Knowing the difference between diffusion and osmosis and defining the osmotic pressures	Osmosis and Osmotic Pressures	=	=

11. Course Evaluation

Exams which include quizzes, midterms, and finals

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	1) Biophysics by Glasser, Springer Verlag(2001) 2) Biology in Physics: Is Life Matter by K. Bogdanov, Academic Press (2000)
Main references (sources)	1) Biophysics: An Introduction by C. Sybesma, Kluwer Academic (1989) 2) Introduction to Molecular Biophysics by J. Tuszynski, CRC Press (2003
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	Internet sites specialized in teaching and explaining biophysics and its concepts

Course Description Form

1. Course Name:
Physics of Biosensors
2. Course Code:
PHY-424
3. Semester / Year:
2023-2024 / 4th medical stage
4. Description Preparation Date:
15-9-2024
5. Available Attendance Forms:
Available

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

2/2

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

Name: Dr.Zeina Abbass Salman
Email: zsalman@uowasit.edu.iq

8. Course Objectives

Course Objectives	• **Provide basic understanding of nanoscience applications in medical physics through the application of physical principles, methods, and techniques.** • **Focus on making students able to identify different types of sensors and their role in medicine and life.** • **Enable students to solve problems physics applications in biological systems.** • **Identify the different types of sensors used in medical instruments and the possibility of using them in medical fields.** • **Enable students to use this information in their future fields of work, such as the fields of scientific research and practical experiences, in a way that contributes to serving society and developing the reality of education in it.**

9. Teaching and Learning Strategies

Strategy	• **Using presentation, participation, problem solving, and discussion.** • **Using modern technology for education and encouraging students to participate in group discussions.** • **Encouraging students to self-learn and form groups to discuss scientific material.**

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	General introduction to sensors	Introduction	Lecture+ Discussion	Exams
2	2	Knowing the different classes of sensors	Definitions of sensors	=	=
3	2	Knowing and recognizing the importance of sensors	Importance of sensors in biology	Lecture	=

		in biology			
4	2	Knowing and defining the different types of sensors	Classification of sensors	Lecture+ Discussion	=
5	2	Defining the parameters of sensors	Parameters of sensors	=	=
6	2	Understanding the physical concepts associated with sensors	Physical transducing principles for sensors	Lecture	=
7	2	Knowing the gravimetric sensors and understanding their work concepts	Gravimetric sensors	=	=
8	2	Knowing the electrical sensors and understanding their work concepts	Electrical sensors	=	=
9	2	Knowing the electrochemical sensors and understanding their work concepts	Electrochemical sensors	Lecture+ Discussion	=
10	2	Knowing the optical sensors and understanding their work concepts	Optical sensors	=	=
11	2	Knowing the nanostructured materials used for sensing	Nanostructured materials for sensors	=	=
12	2	Understanding the sensors made of inorganic materials	Sensors based on inorganic materials	=	=
13	2	Understanding the sensors made of organic materials	Sensors based on organic materials	=	=
14	2	Understanding the organic vapor sensors made of calixarenes	Organic vapor sensors based on Calixarenes	=	=
15	2	Understanding the structure of composite membranes used in biosensing applications	Composite membranes for biosensing	=	=

11. Course Evaluation

Exams which include quizzes, midterms, and finals

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Biosensors: Theory and Applications by D. Buerk (1995)

Main references (sources)	5) Biosensors by J. Cooper and A. Cass, Oxford University Press (2004) 6) Chemical Sensors and Biosensors by B. Eggins, Wiley & Sons (2007)
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	Internet sites specialized in teaching and explaining: • physics of biosensors • the most important sensors used currently in medical applications

Course Description Form

1. Course Name:
Physics of Drug Delivery Systems
2. Course Code:
PHY−412
3. Semester / Year:
2025−2024 / 4th medical stage
4. Description Preparation Date:

15-9-2024

5. Available Attendance Forms:

Available

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

2/2

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

Name: Dr.Zeina Abbass Salman
Email: zsalman@uowasit.edu.iq

8. Course Objectives

Course Objectives	• **Provide basic understanding of nanoscience applications in medical physics through the application of physical principles, methods, and techniques.** • **Focus on making students capable of the various application fields of drug delivery systems and their roles in medicine and life.** • **Enable students to solve problems covering physics applications in various drug transport systems.** • **Understanding how different drug carrier systems work, the possibility of their use in medical fields, and the nature of the materials they are composed of.** • **Enable students to use this information in their future fields of work, such as the fields of scientific research and practical experiences, in a way that contributes to serving society and developing the reality of education in it.**

9. Teaching and Learning Strategies

Strategy	• **Using presentation, participation, problem solving, and discussion.** • **Using modern technology for education and encouraging students to participate in group discussions.** • **Encouraging students to self-learn and form groups to discuss scientific material.**

10. Course Structure

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

1	2	Understanding the function of biomembranes as absorption barriers and biotransformation as a barrier	An Overview: Biomembranes as Absorption Barriers and Biotransformation as a Barrier	Lecture+ Discussion	Exams
2	2	Knowing and being able to define the biological barriers to drug absorption	Biological Barriers to Drug Absorption	=	=
3	2	Knowing the different physico-chemical characteristics of drug substances	Physico-Chemical Characteristics of Drug Substances	Lecture	=
4	2	Understanding and defining the chemical methods of optimizing the drug delivery	Chemical Approaches in Optimization of Drug Delivery	Lecture+ Discussion	=
5	2	Define the polymeric drug delivery systems and their properties	Polymeric Delivery Systems	=	=
6	2	Define the lipid based drug delivery systems and their properties	Lipid Based Delivery Systems	Lecture	=
7	2	Understanding the methods of evaluating the bioavailability of a drug	Methods of Evaluation of Bioavailability	=	=
8	2	Knowing the dissolution methods	Dissolution	=	=
9	2	Understanding the membrane properties such as permeability and its relationship with the diffusion	Membrane Permeability	Lecture+ Discussion	=
10	2	Knowing and understanding in vivo techniques	In vivo Methodology	=	=
11	2	Understanding the chemistry of lipid bilayer structures	The Interplay between Lipid Bilayer Structures	=	=
12	2	Knowing the structural and dynamical functions of biological membranes	Structural and Dynamic Functions of Biomembranes	=	=
13	2	Knowing the effects of luminal contents on the dissolutions/solubilizations	Influence of Luminal Contents on the Dissolution/Solubilizations	=	=
14	2	Understanding the rational design of drug substances and its pharmaceutical formulations	Rational Design of Drug Substances and Pharmaceutical Formulations	=	=
15	2	Knowing the key parameter in drug delivery	Key Parameter in Drug Delivery	=	=

11. Course Evaluation

Exams which include quizzes, midterms, and finals

12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Controlled Drug Delivery: Challenges and Strategies, (Hradcover-2011, amazon.com) by Kinam Park.
Main references (sources)	Nanoparticulate Drug Delivery Systems, (Hradcover-2010, amazon.com) by Thassu Deepak, Michel Deleers, Yashwant Vishnupant Pathak.
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	Internet sites specialized in teaching and explaining: • physics of drug delivery systems • the most important drug delivery systems currently used in medical applications

Course Description Form

1. Course Name :
Nanoscience in Medical Physics
2. Course Code:
PHY−423
3. Semester / Year:
2025−2024/4th medical stage
4. Description Preparation Date:
15−9−2024

5. Available Attendance Forms:

5. Available

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

2/2

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

Name: Dr.Zeina Abbass Salman
Email: zsalman@uowasit.edu.iq

8. Course Objectives

Course Objectives	• **Provide basic understanding of nanoscience applications in medical physics through the application of physical principles, methods, and techniques.** • **Focus on making students capable of the various application fields of nanosystems and their roles in medicine and life.** • **Enable students to solve problems covering nanoscale applications in medical physics.** • **Identify the different nanomaterials used in medical devices and the possibility of using them in medical fields.** • **Enable students to use this information in their future fields of work, such as the fields of scientific research and practical experiences, in a way that contributes to serving society and developing the reality of education in it.**

9. Teaching and Learning Strategies

Strategy	• **Using presentation, participation, problem solving, and discussion.** • **Using modern technology for education and encouraging students to participate in group discussions.** • **Encouraging students to self-learn and form groups to discuss scientific material.**

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	General Introduction to Nanomaterials	Introduction to Nanomaterials	Lecture+ Discussion	Exams
2	2	Knowing the nanomaterials	Bio Inspired Nanomaterials	=	=

		combined with the biomolecules			
3	2	Knowing and recognizing the nanomaterials used for sensing applications	Nanomaterials for Sensing	Lecture	=
4	2	Knowing the different methods of detecting DNA	DNA Detection	Lecture+ Discussion	=
5	2	Techniques and nanomaterials used in optical sensors	Nano scale Optical Sensors	=	=
6	2	Understanding the cellular interfacing	Cellular Interfacing	Lecture	=
7	2	Knowing and understanding how to develop genetic probes	Development of Genetic Probes	=	=
8	2	Understanding the genetic circuit	Genetic Circuit	=	=
9	2	Understanding tracers of DNA	Traces of DNA	Lecture+ Discussion	=
10	2	Introducing the cellular imaging	Cellular Imaging	=	=
11	2	Knowing the nanoparticles used in medical diagnostics	Nanoparticles in Medical Diagnostics	=	=
12	2	Understanding the fundamentals of cancer from a biological standpoint	Cancer Biology Fundamentals	=	=
13	2	Understanding the nanotechnology used in imaging	Nanotechnology Imaging	=	=
14	2	Understanding the challenges in cancer therapy	Challenges in Cancer Therapy	=	=
15	2	Understanding the role of nanotechnology in cancer therapy	Role of Nanotechnology in Cancer Therapy	=	=

11. Course Evaluation

Exams which include quizzes, midterms, and finals

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Nanomaterials for Applications in Medicine and Biology, (Paperback-2008) by Gennady B. Khomutov, Michael Giersig.
Main references (sources)	Nanomaterials and Nanosystems for Biomedical Applications, (Hardcover-2007) by M.Reza Mozafari
Recommended books and references (scientific journals, reports…)	

Electronic References, Websites	Internet sites specialized in teaching and explaining: • nanoscience in medical fields • the most important nanostructures currently used in medical applications

Course Description Form

1. Course Name:
physics of radiation therapy
2. Course Code:
PHY−422
3. Semester / Year:
2023−2024 /4th medical stage
4. Description Preparation Date:

15-9-2024
5. Available Attendance Forms:
5. Available
6. Number of Credit Hours (Total) / Number of Units (Total)
2/ 2/3
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Nadia Naeema Dahaher Email: nanaeema@uowasit.edu.iq

8. Course Objectives	
Course Objectives	1. This course provides the basics of radiotherapy physics and the components of the imaging equipment used through lectures and seminars. 2. The course presents the physical theories and principles of radiotherapy physics, the main components of imaging devices used in radiotherapy, imaging agents and their effect in improving image quality, along with the main pulse sequences used in imaging and their applications with an emphasis on safety considerations, data acquisition mechanisms, 3. The course explains how to process images. The basic details are an explanation of the A summary of the fluoroscopic radiography device, image intensifiers, image quality, computed tomography and magnetic resonance imaging devices.

9. Teaching and Learning Strategies	
Strategy	1. Interactive lectures: Use lectures to introduce basic and complex concepts related to the physics of radiation therapy, while encouraging students to ask questions and participate in discussions. 2. Use of multimedia and technology 3. Evaluation and feedback: Continuous evaluation of students through tests, reports, and presentations while providing constructive feedback that helps improve the learning process. 4. Self-learning and research: Encouraging students to do self-research and explore the latest developments in the field of radiation therapy, which helps in developing research skills and continuous learning. 5- Use of educational technology (data show) Oral discussions

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	Choosing the appropriate technical parameters: Students must learn how to choose the appropriate technical parameters to perform imaging with the various devices that use radiation as the main basis for their operation in clinical practice. This includes understanding how these parameters affect image quality and the information that can be obtained from the scan -Providing continuous learning opportunities for students and motivating them -Organized self-learning - Social Media - self management	Definitions The structure of matter Classification of radiation X-ray production X-ray properties X-ray tube Monthly exam Mammography Fluoroscopy Image Intensifiers CT scanners Image Quality Magnification Gain Principles of Magnetic Resonance Magnetic Resonance Imaging finally exam		

11. Course Evaluation

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

Daily preparation 4 Quiz 3 Seminars 3 Monthly Exam 30 Final Exam 60

12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	
Main references (sources)	**Nuclear Radiation Physics,by R. Lapp and H. Andrews, Prentic-Hall(1972)**
Recommended books and references (scientific journals, reports…)	**The physics of Radiation Therapy ,3rd adition, "Faiz M. Khan,2003**
Electronic References, Websites	**https://ucrfisicamedica.files.wordpress.com/20/10/phys-of-radiation-therapy-3-edicion-khan.pdf** https://secwww.jhuapl.edu/techdigt/Content/techdigest/pdf/V04-N01/04-01-Grant.pdf

Course Description Form

1. Course Name:
Neurophysics
2. Course Code:
PHY-424
3. Semester / Year: 4 th medical stage
2025-2024
4. Description Preparation Date:
15-9-2024
5. Available Attendance Forms:
Full time
6. Number of Credit Hours (Total) / Number of Units (Total)
2/2
7. Course administrator's name (mention all, if more than one name)

Name:	Ali Kamel Mohsin
Email:	aalbedary@uowasit.edu.iq

8. Course Objectives

Course Objectives	Providing Deep Understanding: The program aims to offer a comprehensive understanding of neuroscience and its impact on the vital functions of the body. Encouraging Research and Innovation: The program aims to motivate students to engage in scientific research and develop new solutions and innovations in the field of neuroscience.

9. Teaching and Learning Strategies

Strategy	1. Interactive Lectures 2. Group Discussions 3. Practical Experiments 4. Applied Lessons 5. Research Projects 6. Cooperative Learning 7. Diagnostic Assessment 8. Effective Use of Technology

10. Course Structure

Week	Hou	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1st 2nd 3rd 4th 5th 6th 7th 8th 10th 11th	2 2 2 2 2 2 2 2 2 2	This program targets third-year students of medical physics and aims to equip them with various skills related to the program.	1. Studying the history and evolution of the field of neuroscience. 2. Examining the structure and function of different types of neuronal cells. 3. Understanding the mechanisms of neural signal transmission, including electrical	The theoretical content is delivered through lectures and in-class discussions. Additionally, the course includes practical activities in laboratories to apply the concepts learned.	Students are assessed through multiple-choice exams, written tests, as well as short research projects.

12th 13th 14th 15th	2 2 2 2		and chemical signaling. 4. First assessment test. 5. Exploring different nervous systems, such as the central nervous system and the peripheral nervous system. 6. Second assessment test. 7. Disorders of the nervous system: Causes and treatments. 8. Applications of neuroscience in research and medical applications. 9. Final assessment exam.		

11. Course Evaluation

Grades are distributed based on the units taught, with an average of 5 marks per unit, along with 10 marks for reports and 20 marks for designs and equipment.

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	،Neuroscience: Fifth Edition" Dale Purves Principles of Neural Science" Eric R. Kandel
Main references (sources)	،From Neuron to Brain" John G. Nicholls ،
Recommended books and references (scientific journals, reports…)	Neuron: https://www.cell.com/neuron PubMed: https://pubmed.ncbi.nlm.nih.gov/ ResearchGate: https://www.researchgate.net/ Nature Neuroscience: https://www.nature.com/neuro/ Neuroscience Information Framework (NIF):
Electronic References, Websites	

Course Description Form

1. Course Name:
Heart physics
2. Course Code: PHY-415
3. Semester / Year: 4 th medical stage
2025 - 2024
4. Description Preparation Date:
15-9-2024
5. Available Attendance Forms:
Presence
6. Number of Credit Hours (Total) / Number of Units (Total)
(2h theoretical) & (2Units)
7. Course administrator's name (mention all, if more than one name)
Name: Hanan Abd Ali Thjeel Email: halukely@uowasit.edu.iq
8. Course Objectives

Course Objectives	• **Enable the student to know the basics and theory of heart** • **The course explains the macro and micro-structural properties of the heart** • **It covers the main topics and concepts presented in ECG** • **The purpose of this course is to study the electrical activity and cardiography of the heart.** .
9. Teaching and Learning Strategies	
Strategy	**1. 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 sim experiments involving some interesting sampling activities for the students.** **2. Make the student able to use the devices ECG** **3. The student should be able to analyse waves of heart (chart)**
10. Course Structure	

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

				metho d	
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15	30	A-Knowledge: (Specific facts and knowledge of concepts, theories, formula etc.) B-Cognitive Skills: (Thinking, problem-solving) C- Interpersonal skills and responsibilities: (group participation, leadership, perso responsibility, ethic and moral behavi capacity for self-directed learning) D- Analysis and communication:)communication, mathematical and IT skills) Assessment methods for above elements	- 1 The cardiovascular system, structural organization and properties 2 The cardiac cycle 3 Heart as a pump and cardiac functions 4 Pulse wave propagation 5 Flow patterns in complex internal geometry 6 Wall dynamics in infinitesima and finite displacement 7 Modeling of three-dimensiona flow 8 Ventricle fluid dynamics 9 Pathological conditions and valve dynamics 10 Local blood flow in arteries 11 Newtonian and non-Newton flow 12 Navier Stokes equations 13 Mass transport in arteries 14 Artery wall properties 15 An overview of ECG a applications	Presenc	-Theoretical exam -oral exam -Reports

11. Course Evaluation

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

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Textbook: Theory of Heart: Biomechanics, Biophysics, and Nonlin Dynamics of Cardiac Function, by L. Glass, P. Hunter, and A. McCulloch, Springer (1991).).
Main references (sources)	.
Recommended books and references (scientific journals, reports…)	. Supplementary references 4- Mathematically modelling the electrical activity o the Heart: From Cell to Body Surface and Back, by Pullman, World Scientific Publishing (2005). 5- 2- Electrophysiology and Pharmacology of Heart, K. Dangmann, (1991). 3- Physiology of the Heart, A. Katz, (2006
Spectra References, Websites	

Course Description Form

1. Course Name:
Nuclear and spectroscopic analysis
2. Course Code: PHY−421
3. Semester / Year: 4 th medical stage
2025− 2024
4. Description Preparation Date:
15−9−2024
5. Available Attendance Forms:
Presence
6. Number of Credit Hours (Total) / Number of Units (Total)
(2h theoretical) & (2Units)
7. Course administrator's name (mention all, if more than one name)
Name: Hanan Abd Ali Thjeel Email: halukely@uowasit.edu.iq
8. Course Objectives

Course Objecti	• **Enable the student to know the basics of spectra and applications.** • **The student's knowledge of theories of experiments such as Faraday and the study of polarization** • **It covers the main topics and concepts presented in the theoretical course of Atomic and Molecular Spectra PHYS344.** • The practical test and suitable application on some phenomena not studied during the course .
9. Teaching and Learning Strategies	
Strategy	**1. 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 sim experiments involving some interesting sampling activities for the students.** **2. Make the student able to use the devices in the spectroscopic laboratory and carry out experiments.** **3. The student should be able to analyse experiments and understand phenomena**

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15	30	A. Knowledge: Polarization, line spe and birefringence. B. Cognitive Skills: The student wo be able to select the best experimen analytical method suitable for the phy phenomena under study. C. Interpersonal skills responsibilities: D. Analysis and communication.	- 1 Introduction 2 Faraday effect 3 Theoretical introduction about light spectrophotometers and related equations 4 Practice the usage of a spectrophotometer 5 exams. 6 Thermal radiation 7 Zeeman effect (an application the atomic spectra) 8 Periodic practical exams. 9 Introduction to fluorescence instruments and application 10 Usage of fluorescence instrument and applying to one sample 11 Periodic practical exams. 12 Optical Kerr effect experime and its capabilities 13 Revision 14 Revision 15 Revision	Presenc	-Theoretical exam -oral exam -Reports

11. Course Evaluation

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

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	"Experiments and Demonstrations in Physics" by Yaakov Kraftmakher. 2007 World Scientific Publishing Co .Pte .Ltd.
Main references (sources)	.
Recommended books and references (scientific journals, reports…)	. Supplementary references: "Concepts of Modern Physics" 6th edition by Arthur Beiser. 2003 The McGraw HiII Companie
Spectra References, Websites	

Course Description Form

1. Course Name
Medical devices
2. Course Code
PHY-423
3. Semester / Year
First Semester (2025-2024)
4. Description Preparation Date:
15-9-2024
5. Available Attendance Forms
Actual Attendance
6. Number of Credit Hours (Total) / Number of Units (Total)
2/2
7. Course administrator's name (mention all, if more than one name)
Name: Asst. Prof. Dr Muhaned Zaidi **Email: m.zaidi@uowasit.edu.iq**
8. Course Objectives

Course Objectives	**1. Understanding the principles of operation and design of various medical devices.** **2. Identifying the functions of medical devices in diagnostic, therapeutic, and monitoring fields.** **3. Evaluating the importance of using medical devices in improving healthcare quality.** **4. Understanding safety requirements, quality standards, and legal regulations related to the use of medical devices.** **5. Acquiring the necessary skills for effectively maintaining and repairing medical devices.** **6. Recognizing recent advancements in medical device technology and their vital applications.** **7. Understanding the principles of medical device design and the technology behind them.** **8. Identifying types of medical devices and their**

	different functions. **9. Understanding how medical devices are used in diagnosis, treatment, and patient monitoring.** **10. Recognizing safety and quality requirements in the use of medical devices.** **11. Evaluating the performance of medical devices and ensuring their quality.** **12. Understanding recent developments in medical device technology and their applications.**

9. Teaching and Learning Strategies

Strategy	- **Group discussions and assignments** - **Creating a competitive atmosphere among students and addressing individu differences using appropriate educational methods** - **Research projects** - **Interdisciplinary discussion circles** - **Incorporating teaching methods that utilize educational technology** - **Encouraging students for self-directed learning.**

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Referred to in the previous axis and each according to the content	Introduction to Medical Technology: History and Development of Medical Devices, Design and Operation Principles.	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
2	2		Fundamentals of Biomedical Engineering: Medical Physics, Medical Electronics, Medical Biology.	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
3	2		Types of medical devices: classifications of medical devices by function and application, such as medical devices for measuring pressure, medical imaging devices, pacemakers, and others.	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
4	2		For the production of X-rays	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
5	2		Components of the X-ray machine	**Theoretical**	**Daily preparation, daily and oral**

					exams on the board and assignments
6	2		Tomography Computerized Tomography Machine	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
7	2		DEXA bone density test	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
8	2		ESW shockwave lithotripsy		**written exams**
9	2		test	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
10	2		Safety and compliance with standards: engineering and medical considerations in ensuring patient safety and the effectiveness of medical devices, compliance with national and international standards and legislation.	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
11	2		MRI, radiotherapy	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
12	2		discussion	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
13	2		Ultrasound in Imaging Medicine	**Theoretical**	**Daily preparation, daily and oral exams on the board and assignments**
14	2		discussion		**Daily preparation, daily and oral exams on the board and assignments**
15	3		examination		

11.Course Evaluation

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

Course	Daily preparation, daily and oral exams	Daily assignments	reports	Seminars	Mid-term Exam	Final -Exam
2nd	**10**	**10**	**5**	**5**	**10**	**60**

12.Learning and Teaching Resources

Required textbooks (curricular books, if any)	Medical Instrumentation: Application and Design" by Johr

	Webster
Main references (sources)	"Medical Devices: Surgical and Image-Guided Technologies" by Gautham Vadakkepatt و Ravi V. Bellamkonda
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	PubMed https://pubmed.ncbi.nlm.nih.gov/) MedlinePlus (https://medlineplus.gov/)

Course Description Form

1. Course Name:
Medical Statistics2
2. Course Code
PHY-421
3. Semester / Year
Second Semester (2025-2024)
4. Description Preparation Date:
15-9-2024
5. Available Attendance Forms
Actual Attendance
6. Number of Credit Hours (Total) / Number of Units (Total)
2/2
7. Course administrator's name (mention all, if more than one name)
Name: Asst. Prof. Dr Muhaned Zaidi **Email: m.zaidi@uowasit.edu.iq**
8. Course Objectives

Course Objectives	**1. Understanding the concepts and basic principles of medical statistics.** **2. Applying descriptive and inferential statistical methods to analyze healthcare data.** **3. Designing studies and research experiments using appropriate sampling methods and statistical techniques.** **4. Interpreting statistical results and drawing meaningful conclusions from healthcare data.** **5. Evaluating the validity and reliability of statistical evidence in healthcare research.** **6. Using statistical software packages to conduct data analysis and generate statistical outputs.** **7. Effectively communicating statistical results in written reports and presentations.**

	8. Adhering to ethical principles and guidelines in collecting, analyzing, and reporting healthcare data. **9. Collaborating with multidisciplinary teams to integrate statistical analysis into healthcare practice and research.** **10. Applying critical thinking skills to evaluate statistical claims and research findings in medical literature.**

9. Teaching and Learning Strategies

Strategy	• **Group discussions and assignments** • **Creating a competitive atmosphere among students and addressing individual differences using appropriate educational methods** • **Research projects** • **Interdisciplinary discussion circles** • **Incorporating teaching methods that utilize educational technology** • **Encouraging students for self-directed learning.**

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Referred to in the previous axis and each according to the content	Introduction to Medical Statistics	Theoretical	Daily preparation, daily and oral exams on the board and assignments
2	2		Research Design and Medical Data Collection	Theoretical	Daily preparation, daily and oral exams on the board and assignments
3	2		Medical Data Analysis: Descriptive Statistics	Theoretical	Daily preparation, daily and oral exams on the board and assignments
4	2		Medical Data Analysis: Analytical Statistics	Theoretical	Daily preparation, daily and oral exams on the board and assignments
5	2		Population & Samples	Theoretical	Daily preparation, daily and oral exams on the board and assignments
6	2		Random sample	Theoretical	Daily preparation, daily and oral exams on the board and assignments
7	2		Data types	Theoretical	Daily preparation, daily and oral exams on the board and

					assignments
8	2		Description of datasets		written exams
9	2		Possibilities	Theoretical	Daily preparation, daily and oral exams on the board and assignments
10	2		Probability distribution function	Theoretical	Daily preparation, daily and oral exams on the board and assignments
11	2		Binary distribution	Theoretical	Daily preparation, daily and oral exams on the board and assignments
12	2		Using Statistics in Assessing Clinical Outcomes.	Theoretical	Daily preparation, daily and oral exams on the board and assignments
13	2		Applications of statistics in medical research	Theoretical	Daily preparation, daily and oral exams on the board and assignments
14	2		training		Daily preparation, daily and oral exams on the board and assignments
15	2		Exam	review	reports

11. Course Evaluation

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

Course	Daily preparation, daily and oral exams	Daily assignments	reports	Seminars	Mid-term Exam	Final -Exam
2nd	**10**	**10**	**5**	**5**	**10**	**60**

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Statistical Data Analysis for the Physical Sciences Adrian Bevan
Main references (sources)	Medical Statistics for Beginners by (Ramakrishna HK)
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

Course Description Form

1. Course Name : **Mathematical methods**
2. Course Code PHY-422
3. Semester / Year
Semester(2025−2024)
4. Description Preparation Date:.
15−9−2024
5. Available Attendance Forms
Actual Attendance
6. Number of Credit Hours (Total) / Number of Units (Total)
2 / 2 units
7. Course administrator's name (mention all, if more than one name)
Name:D.r Faiq Jameel Hassan **Email: @uowasit.edu.iq**
8. Course Objectives

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

9. Teaching and Learning Strategies

Strategy	Group discussions and assignments Creating an atmosphere of competition among students and treating individual differences using appropriate educational methods Research groups - nested discussion circles. - Teaching methods include the use of educational technology - Encouraging students to self-learn.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	(2 **Th)**	Curvilinear coordinate systems Gradient, Divergence, Curl and Laplacian in orthogonal Curvilinear coordinate	Vector Calculus	**Deliverance - discussion**	**General questions and discussion**
2	(2 **Th)**	Curvilinear coordinate systems Gradient, Divergence, Curl and Laplacian in orthogonal Curvilinear coordinate	Vector Calculus	**Deliverance - discussion**	**General questions and discussion**
3	(2 **Th)**	Special coordinate syste Rectangular Cartesian coordinate	coordinate systems	**Deliverance - discussion**	**General questions and discussion**
4	(2 **Th)**	Special coordinate syste Rectangular Cartesian coordinate	coordinate systems	**Deliverance - discussion**	**General questions and discussion**
5	(2 **Th)**	Special coordinate syste Rectangular Cartesian coordinate	coordinate systems	**Deliverance - discussion**	**General questions and discussion**
6	(2 **Th)**	Complex Numbers Arga diagram	Complex Numbers	**Deliverance - discussion**	**General questions and discussion**
7	(2 **Th)**	Complex Numbers Arga diagram	Complex Numbers	**Deliverance - discussion**	**General questions and discussion**
8	(2 **Th)**	Functions of a Complex variable Analytic Functic	Functions of a Complex variable		**General questions and discussion**
9	(2 **Th)**	Functions of a Complex variable Analytic Functic	Functions of a Complex variable	**Deliverance - discussion**	**General questions and discussion**
10	(2 **Th)**	Functions of a Complex variable Analytic Functic	Functions of a Complex variable	**Deliverance - discussion**	**General questions and discussion**
11	(2 **Th)**	Functions of a Complex variable Analytic Functic	Functions of a Complex variable	**Deliverance - discussion**	**General questions and discussion**
12	(2 **Th)**	Laurent theorem Singul	Fourier Series	**Deliverance - discussion**	**General questions and discussion**

		point The residue theor Periodic functions Fouri Series			
13	(2 **Th)**	Laurent theorem Singul point The residue theor Periodic functions Fouri Series	Fourier Series	**Deliverance - discussion**	General questions and discussion
14	(2 **Th)**	Laurent theorem Singul point The residue theor Periodic functions Fouri Series	Fourier Series	**Deliverance - discussion**	General questions and discussion
15	(2 **h)**	Laurent theorem Singul point The residue theor Periodic functions Fouri Series	Fourier Series	**Deliverance - discussion**	**General questions and discussion**
16	(2h)		**Second Exam**		

11. Course Evaluation

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

Course	Daily preparation, daily and oral exams	Daily assignments	reports	Seminars	Mid-term Exam	Final -Exam
1st	**15**	**15**	**5**	**5**	**10**	**50**

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	G Farkhad, Mathematical Methods for Physics: Problems and Solutions, 2023
Main references (sources)	Arfekn, Mathematical Methods for Physicists 7e.
Recommended books and references (scientific journals, reports…)	H. J. Weber and G. B. Arfken, "Essential Mathematical Methods for Physicists", Academic Press, 2003.
Electronic References, Websites	Methods in Applied Mathematics authored by Dr. Basil Yaqoub Youssef, University of Basra – Iraq,9191.

Academic Program Description Form

University Name / University of Wasit

College / Institute / College of Science

Scientific Department / Department of Physics

Name of Academic or Professional Program

Bachelor's of Science Degree (General Physics / Medical Physics)

Name of Final Degree / (Bachelor's of Science in General Physics and Bachelor's of Science in Medical Physics)

Semesters /Academic System: Bologna, Grade1 and Grade 2.

Date of Preparation: 1/8/ 2024

Date of File Completion: September 1 /9/ 2024

File verified by:

Quality Assurance and University Performance Department

Director of Quality Assurance and University Performance Department: Asst. Prof. Dr. Hussain Taqi John

Assist Prof
Dr. Faik Jameel Hassan Mayah
Dean

Dean's approval: Prof. Dr. Faik Gamil Hassan

Date: 1 / 9 / 2024 Signature: