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 Baghdad

Faculty/Institute: College of Science

Scientific Department: Physics

Academic or Professional Program Name: Bachelor of Physics

Final Certificate Name: Bachelor of Physics

Academic System: semester

Description Preparation Date: 2-4-2024

File Completion Date: 2-4-2024

Signature:

Head of Department Name:

Prof. Dr. Mohammed Kadhim Jawad

Date:

Signature:

Scientific Associate Name:

Prof. Dr. Namir I. A. Haddad

Date:

The file is checked by: Prof. Dr.Israa Ali Zaidan

Department of Quality Assurance and University Performance

Director of the Quality Assurance and University Performance Department:

Date:

Signature:

Approval of the Dean:

Asset. Prof. Dr.Raed Falih Hassan

1. Program Vision

The College of Science seeks to prepare graduates in the field of physical sciences to work in government departments and benefit from specialization in the practical and applied field

2. Program Mission

Working to prepare and graduate leading scientific and leadership competencies in the field of physics and to develop the balance of knowledge in the field of branches of physics to serve the local, regional and international community, as well as training and refining the minds of students scientifically and cognitively, emphasizing social and cultural values and responding to the requirements of the local market.

3. Program Objectives

1- Understand and understand physics, solve physics problems, and develop solutions to them.

2- Dealing with physical problems and developing solutions to them

3- Understanding mathematical methods and techniques in solving problems in physical sciences

4. Program Accreditation

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

Nothing

5. Other external influences

Is there a sponsor for the program? **Nothing**

6. Program Structure				
Program Structure	**Number of Courses**	**Credit hours**	**Percentage**	**Reviews***
Institution Requirements	9	19	16%	Support or related learning activity
College Requirements	4	17	8%	Basic
Department Requirements	32	180	68%	Core learning activities
	4	24	8%	Elective
Summer Training	**Nothing**			
Other				

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

7. Program Description

Year/Level	Course Code	Course Name	Credit Hours	
			Theoretical	**Practical**
2023-2024 First/First Course	**PHY 1101**	Mechanics and properties of Matter (1)	**2**	**2**
	PHY 1102	Electricity	**2**	**2**
	UOB 103	Computer Skill (1)	**1**	**2**
	UOB 104	Democracy and Human Right	**2**	
	COS 1105	Mathematic (1)	**2**	
	UOB 101	Arabic Language (1)	**2**	**2**
2023-2024 First/Second Course	**PHY 1207**	Mechanics and properties of Matter (2)	**2**	**2**
	PHY 1208	Magnetism	**2**	**2**
	PHY 1209	Geometrical Optics	**2**	**2**
	COS 1210	Mathematics (2)	**2**	
	COS 1211	General Chemistry	**2**	**2**
	UOB 102	English Language (1)	**2**	**2**
2023-2024 Second/ First Course	**PHY 2313**	Modern Physics (1)	**2**	**2**
	PHY 2314	Heat and Thermodynamic	**2**	**2**
	PHY 2315	Analytical Mechanic (1)	**2**	
	PHY 2316	Analog Electronics	**2**	**2**
	UOB 208	Crime of the Baath regime in iraq	**2**	

	UOB 206	English language (2)	**2**	
	UOB 205	Arabic Language (2)	**2**	**2**
2023-2024 Second/ Second Course	**PHY 2420**	Modern Physics (2)	**2**	**2**
	PHY 2421	Thermodynamic and Statistical	**2**	**2**
	PHY 2422	Analytical Mechanic (2)	**2**	
	PHY 2423	Digital Electronics	**2**	**2**
	COS 2424	Mathematics (3)	**2**	
	UOB 207	Computers Skill (2)	**1**	**2**
2023-2024 Third/ First Course	**PHY 3526**	Molecular Physics	**2**	
	PHY 3527	Physical Optics	**2**	**2**
	PHY 3528	Quantum Mechanics (1)	**3**	
	PHY 3529	Material Physics (1)	**2**	**2**
	PHY 3530	Laser Physics (1)	**2**	**2**
	PHY 3531	**Optional (1)**	**2**	
	PHY 3531-1	Photo Physics		
	PHY 3531-2	Solar Energy Applications		
	PHY 3531-3	Elementary Particles		
	PHY 3531-4	Thin Films Physics		
	PHY 3531-5	Powder Physics		
	PHY 3531-6	High Voltage Physics		
2023-2024 Third/ Second Course	**PHY 3632**	Mathematical Physics	**2**	
	PHY 3633	Quantum Mechanics (2)	**3**	
	PHY 3634	Material Physics (2)	**2**	**2**
	UOB 309	Scientific Research Methodology	**1**	
	PHY 3636	Laser Physics (2)	**2**	**2**
	PHY 3637	**Optional (2)**	**2**	
	PHY 3637-1	Renewable Energy		
	PHY 3637-2	Optical Fiber		
	PHY 3637-3	Radiation Physics		
	PHY 3637-4	Detector Physics		
	PHY 3637-5	Biomaterials		
	PHY 3637-6	Electrical Discharge Physics	**2**	
2023-2024 Fourth/ First Course	**PHY 4738**	Nuclear Physics (1)	**2**	**2**
	PHY 4739	Solid State Physics (1)	**2**	**2**

	PHY 4740	Electromagnetic Theory (1)	**2**	**2**
	PHY 4741	Research Project (1)	**2**	**2**
	PHY 4742	**Optional (3)**	**2**	
	PHY 4742–1	Spectroscopy		
	PHY 4742–2	Nonlinear Optics		
	PHY 4742–3	Medical Physics		
	PHY 4742–4	Semiconductors		
	PHY 4742–5	polymer Physics		
	PHY 4742–6	Plasma Diagnostic Methods		
	PHY 4743	Nano Physics	**2**	**2**
2023-2024 Fourth/ Second Course	**PHY 4844**	Nuclear Physics (2)	**2**	**2**
	PHY 4845	Solid State Physics (2)	**2**	**2**
	PHY 4846	Electromagnetic Theory (2)	**2**	**2**
	PHY 4847	Plasma Physics	**2**	
	PHY 4848	Research Project (2)	**2**	
	PHY 4849	**Optional (4)**	**2**	
	PHY 4849–1	Molecular Techniques and Instrumentation		
	PHY 4849–2	Photonics		
	PHY 4849–3	Nuclear Models		
	PHY 4849–4	Superconductivity		
	PHY 4849–5	Surface Physics		
	PHY 4849–6	Plasma Applications		

8. Expected learning outcomes of the program

Knowledge	
	1. Keeping pace with the development of physics according to the requirements of the labor market 2. Communicate with and develop everything that is new or useful
Skills	
	1. The ability to understand physics and apply it practically. 2. Dealing with crises and physical problems. 3. Building mathematical and quantitative foundations for students in the Physics Department
Ethics	
	Developing students' abilities to share ideas

9. Teaching and Learning Strategies

1- Explaining the scientific material to students in detail.

2- Students' participation in solving mathematical problems

3- Discussion and dialogue about vocabulary related to the topic

10. Evaluation methods

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

11. Faculty

Faculty Members

Academic Rank	Specialization		Special Requirements/Skills (if applicable)		Number of the teaching staff	
	General	Special			Staff	Lecturer
Professor (9)	physics	Thin films			**Staff**	
Professor (6)	physics	Nuclear			**Staff**	
Professor (5)	physics	Laser and molecular			**Staff**	
Professor (5)	physics	Laser and Electro optics			**Staff**	
Professor (12)	physics	Materials			**Staff**	
Professor (5)	physics	Plasma			**Staff**	
Assistant Professor (number 7)	physics	Thin films			**Staff**	
Assistant Professor (6)	physics	Nuclear			**Staff**	
Assistant Professor (4)	physics	Laser and molecular			**Staff**	
Assistant Professor (8)	physics	Laser and Electro optics			**Staff**	
Assistant Professor (6)	physics	Materials			**Staff**	
Assistant Professor (2)	physics	Plasma			**Staff**	
Lecturer (3)	physics	Thin films			**Staff**	
Lecturer (5)	physics	Nuclear			**Staff**	
Lecturer (3)	physics	Laser and molecular			**Staff**	
Lecturer (3)	physics	Laser and Electro optics			**Staff**	
Lecturer	physics	Materials			**Staff**	
Lecturer (1)	physics	Plasma			**Staff**	

Assistant teacher (number 1)	physics	Thin films			**Staff**	
Assistant Lecturer (2)	physics	Nuclear			**Staff**	
Assistant Lecturer (2)	physics	Laser and molecular			**Staff**	
Assistant lecturer (2)	physics	Laser and Electro optics			**Staff**	
Assistant Lecturer (4)	physics	Materials			**Staff**	
Assistant Lecturer (2)	physics	Plasma			**Staff**	

Professional Development

Mentoring new faculty members

To orient new faculty members, you need to:

1. Guidance and training program: There must be an integrated program to guide and train them on the policies and procedures of the educational institution, effective teaching methods, the use of technology in education, and dealing with students and parents.
2. Educational materials: The necessary educational materials must be provided to help them prepare and deliver lessons effectively.
3. Technical support: There should be technical support available to them in case they encounter technical problems while using technology in education.
4. Reviews and evaluation: Periodic reviews and evaluation of their performance should be provided to identify strengths and weaknesses and provide the necessary guidance and support.
5. Administrative support: They need administrative support to help manage daily business and administrative procedures.
6. Professional development opportunities: Opportunities for professional development and continuous training should be provided to members of the teaching staff to develop their skills and keep pace with the latest innovations in the field of education. Leadership presence: There must be a leadership presence to support, guide and motivate them to achieve their educational goals.

Professional development of faculty members

For professional development of faculty members, the following elements must be provided:

1. Training programs and workshops: Providing training programs and workshops in various fields such as modern teaching techniques, curriculum development, educational evaluation, and personal and social skills development.
2. Online learning opportunities: Providing easy and flexible access to online educational courses in various areas such as educational technology, language skills development, and classroom management.
3. Participation in conferences and seminars: Encouraging faculty members to participate in local and international conferences and seminars to exchange experiences and knowledge and follow the latest innovations in the field of education.

4. Performance evaluation and feedback: Providing effective mechanisms to evaluate the performance of faculty members and provide them with feedback to identify strengths and weaknesses and identify areas in which they need development.
5. Motivational and encouragement programs: Create motivational programs that encourage faculty members to continue learning and achieve professional development.
6. Individual guidance: Providing individual guidance sessions for faculty members to discuss their career goals and determine the steps necessary to achieve them.
7. Providing leadership opportunities: Providing opportunities to participate in administrative and leadership activities within the educational institution, which helps them develop leadership and organizational skills.
8. Constructive communication with the Continuing Education Division

12. Acceptance Criterion

The student must have a preparatory certificate within the scientific stream

13. The most important sources of information about the program

1. Fundamentals of Physics, by Halliday, Resnick and Wallker.
2. Fundamentals of Physics Extended, 10th Edition, David Halliday, Robert Resnick, Jearl Walker. August 2013.
3. M. Russell Wehr and James A. Richards "The physics of the atom"
4. Mark Waldo Zemansky_ Richard Dittman - Heat and thermodynamics _ an intermediate textbook (1997, McGraw-Hill
5. Electronic devices by Thomas L. Floyed
6. Physics of atoms and molecules, B.H. Bransden and C. J. Joachain
7. Introduction to modern optics by G. Fowels.
8. Introduction to Quantum Mechanics, D. J. Grifiths , second Edition.
9. Nuclear Physics Concepts, By Meyerhof.
10. Introduction to solid state physics by Charles Kittel
11. Introduction to Electrodynamics, by David Griffiths, Prentice-Hall, 1999.
12. Nanotechnology and Nanoelectronics, W.R. fahrener, materials, devices, techniques.
13. Introduction to Plasma Physics and Controlled Fusion, Third Edition, by F.F. Chen, 2016.

14. Program Development Plan

The first stage: assessment of the current situation

1. Conduct a comprehensive evaluation of the current academic program of the Department of Physics.
2. Identify the strengths, weaknesses, opportunities and challenges of the current program.
3. Conduct a survey of the opinions of students, program graduates, and faculty members to determine the areas in which the program needs development.

The second stage: setting goals and priorities

1. Setting specific and measurable goals for developing the academic program.
2. Identify priorities and key areas to focus on to improve the program.

The third stage: planning and implementation

1. Developing updated educational curricula that include the latest developments and technologies in the field of physical science technologies.
2. Create new educational courses covering modern and advanced topics in physical sciences.
3. Develop practical and laboratory training programs that allow students to apply theoretical concepts in a practical environment.
4. Modernizing and developing laboratory facilities and equipment to be compatible with the latest technologies and standards in the field.
5. Providing external learning opportunities through field visits to the laboratories and facilities of the Physics Department.

The fourth stage: evaluation and follow-up

1. Evaluate the developed program through the use of specific evaluation metrics and indicators.
2. Collect feedback from students, faculty, and employers on the effectiveness of the changes introduced.

3. Make additional adjustments and improvements based on evaluation results and feedback.

The fifth stage: continuity and continuous development

1. Establishing mechanisms for continuous monitoring and evaluation of the program's performance and ensuring continuity of development.

2. Providing continuous training opportunities for faculty members to maintain their knowledge of the latest developments in the field of physical sciences.

3. Continuous communication with employers to ensure that the program is updated in line with the needs of the labor market and technological developments in the field.

Program Skills Outline															
				Required program Learning outcomes											
Year/Level	Course Code	Course Name	Basic or optional	Knowledge				Skills				Ethics			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4
2023-2024 First/First Course	PHY 1101	Mechanics and properties of Matter (1)	Basic	√	√	√	√	√	√	√	√	√	√	√	√
	PHY 1102	Electricity	Basic	√	√	√	√	√	√	√	√	√	√	√	√
	UOB 103	Computer Skill (1)	Basic	√	√	√	√	√	√	√	√	√	√	√	√
	UOB 104	Democracy and Human Right	Basic	√	√	√	√	√	√	√	√	√	√	√	√
	COS 1105	Mathematic (1)	Basic	√	√	√	√	√	√	√	√	√	√	√	√
	UOB 101	Arabic Language (1)	Basic	√	√	√	√	√	√	√	√	√	√	√	√
2023-2024 First/Second Course	PHY 1207	Mechanics and properties of Matter (2)	Basic	√	√	√	√	√	√	√	√	√	√	√	√
	PHY 1208	Magnetism	Basic	√	√	√	√	√	√	√	√	√	√	√	√
	PHY 1209	Geometrical Optics	Basic	√	√	√	√	√	√	√	√	√	√	√	√

	COS 1210	Mathematics (2)	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
	COS 1211	General Chemistry	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
	UOB 102	English Language (1)	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
2023-2024 Second / First Course	PHY 2313	Modern Physics (1)	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
	PHY 2314	Heat and Thermodynamic	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
	PHY 2315	Analytical Mechanic (1)	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
	PHY 2316	Analog Electronics	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
	UOB 208	Crime of the Baath regime in iraq	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
	UOB 206	English language (2)	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
	UOB 205	Arabic Language (2)													
2023-2024 Second /Second Course	PHY 2420	Modern Physics (2)	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
	PHY 2421	Thermodynamic and Statistical	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
	PHY 2422	Analytical Mechanic (2)	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√

	PHY 2423	Digital Electronics	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
	COS 2424	Mathematics (3)	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
	UOB 207	Computers Skill (2)	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
2023-2024 Third /First Course	PHY 3526	Molecular Physics	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
	PHY 3527	Physical Optics	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
	PHY 3528	Quantum Mechanics (1)	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
	PHY 3529	Material Physics (1)	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
	PHY 3530	Laser Physics (1)	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
	PHY 3531	**Optional (1)**	**Elective**	√	√	√	√	√	√	√	√	√	√	√	√
	PHY 3531-1	Photo Physics	**Elective**	√	√	√	√	√	√	√	√	√	√	√	√
	PHY 3531-2	Solar Energy Applications	**Elective**	√	√	√	√	√	√	√	√	√	√	√	√
	PHY 3531-3	Elementary Particles	**Elective**	√	√	√	√	√	√	√	√	√	√	√	√
	PHY 3531-4	Thin Films Physics	**Elective**	√	√	√	√	√	√	√	√	√	√	√	√
	PHY 3531-5	Powder Physics	**Elective**	√	√	√	√	√	√	√	√	√	√	√	√
	PHY 3531-6	High Voltage Physics	**Elective**	√	√	√	√	√	√	√	√	√	√	√	√

2023-2024 Third /Second Course	PHY 3632	Mathematical Physics	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
	PHY 3633	Quantum Mechanics (2)	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
	PHY 3634	Material Physics (2)	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
	UOB 309	Scientific Research Methodology	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
	PHY 3636	Laser Physics (2)	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
	PHY 3637	**Optional (2)**	**Elective**	√	√	√	√	√	√	√	√	√	√	√	√
	PHY 3637-1	Renewable Energy	**Elective**	√	√	√	√	√	√	√	√	√	√	√	√
	PHY 3637-2	Optical Fiber	**Elective**	√	√	√	√	√	√	√	√	√	√	√	√
	PHY 3637-3	Radiation Physics	**Elective**	√	√	√	√	√	√	√	√	√	√	√	√
	PHY 3637-4	Detector Physics	**Elective**	√	√	√	√	√	√	√	√	√	√	√	√
	PHY 3637-5	Biomaterials	**Elective**	√	√	√	√	√	√	√	√	√	√	√	√
	PHY 3637-6	Electrical Discharge Physics	**Elective**												
2023-2024 Fourth /First Course	PHY 4738	Nuclear Physics (1)	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
	PHY 4739	Solid State Physics (1)	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√

	PHY 4740	Electromagnetic Theory (1)	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
	PHY 4741	Research Project (1)	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
	PHY 4742	**Optional (3)**	**Elective**	√	√	√	√	√	√	√	√	√	√	√	√
	PHY 4742–1	Spectroscopy	**Elective**	√	√	√	√	√	√	√	√	√	√	√	√
	PHY 4742–2	Nonlinear Optics	**Elective**	√	√	√	√	√	√	√	√	√	√	√	√
	PHY 4742–3	Medical Physics	**Elective**	√	√	√	√	√	√	√	√	√	√	√	√
	PHY 4742–4	Semiconductors	**Elective**	√	√	√	√	√	√	√	√	√	√	√	√
	PHY 4742–5	polymer Physics	**Elective**	√	√	√	√	√	√	√	√	√	√	√	√
	PHY 4742–6	Plasma Diagnostic Methods	**Elective**	√	√	√	√	√	√	√	√	√	√	√	√
	PHY 4743	Nano Physics	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
2023-2024 Fourth /Second Course	PHY 4844	Nuclear Physics (2)	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
	PHY 4845	Solid State Physics (2)	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
	PHY 4846	Electromagnetic Theory (2)	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
	PHY 4847	Plasma Physics	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√

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

	PHY 4848	Research Project (2)	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
	PHY 4849	**Optional (4)**	**Elective**	√	√	√	√	√	√	√	√	√	√	√	√
	PHY 4849-1	Molecular Techniques and Instrumentation	**Elective**	√	√	√	√	√	√	√	√	√	√	√	√
	PHY 4849-2	Photonics	**Elective**	√	√	√	√	√	√	√	√	√	√	√	√
	PHY 4849-3	Nuclear Models	**Elective**	√	√	√	√	√	√	√	√	√	√	√	√
	PHY 4849-4	Superconductivity	**Elective**	√	√	√	√	√	√	√	√	√	√	√	√
	PHY 4849-5	Surface Physics	**Elective**	√	√	√	√	√	√	√	√	√	√	√	√
	PHY 4849-6	Plasma Applications	**Elective**	√	√	√	√	√	√	√	√	√	√	√	√

Course Description Form

1. Course Name:
Atomic Physics I
2. Course Code:
PHY 2313
3. Semester / Year:
First semester /Second Stage
4. Description Preparation Date:
2024-4-2
5. Available Attendance Forms:
Weekly
6. Number of Credit Hours (Total) / Number of Units (Total)
30 hours
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Mohammed Abdullah Hameed Email: mohammed.a@sc.uobaghdad.edu.iq
8. Course Objectives

Course Objectives	Teaching students the basic principles of physics. 2. Preparing specialists in the field of general physics and its practical applications, which bears the responsibility of studying the country's need for development and progress and capable of meeting the needs of the job market in state institutions and industry sectors. 3. Preparing an educated generation armed with science and adopts it as a sound basis to bring about radical changes and assign scientific knowledge and scientific methods in thinking, analysis and adaptation with the development of technologies, to keep up with the expansion of human needs. 4. Effective contribution for deepening and documenting the connection of the university with the society through the implementation of advisory counseling, training and development of teaching and administrative staff. 5. The service of preparing graduates specialized in physics who contribute to development in the country. 6. Meeting the needs of various sectors with highly qualified personals in the field of physics. 7. Encouraging the distinguished in this field to work as teaching assistants in the department to be part of the academic teaching staff in the future.

9. Teaching and Learning Strategies

Strategy	

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

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	**2 hours**	Chapter1	Relativity 1.1 The principle of relativity 1.2 Inertial system of coordinates	Theoretical	General questions +Exam
2	**2 hours**	Chapter2	1.3 Galilean transformation 1.4 Einstein's special theory of relativity	Theoretical	General questions +Exam
3	**2 hours**	Chapter3	1.5 Lorentz transformation 1.6 Inverse Lorentz transformation	Theoretical	General questions +Exam
4	**2 hours**	Chapter4	1.7 Length contractions 1.8 time dilation	Theoretical	General questions +Exam
5	**2 hours**	Chapter5	1.9 Transformation of velocity 1.10 Change of mass with velocity	Theoretical	General questions +Exam
6	**2 hours**	Chapter6	1.11 Mass energy equivalence 1.12 Example of relativistic calculation	Theoretical	General questions +Exam
7	**2 hours**		**Exam**	Theoretical	Exam
8	**2 hours**	Chapter7	Atomc view of electricity 2.1 Electrical discharges 2.2 Thomson's measurements of q/m	Theoretical	General questions +Exam
9	**2 hours**	Chapter8	2.3 Electron charge (Milikan's oil drop experiment) 2.4 Mass of the electron	Theoretical	General questions +Exam

10	**2 hours**	Chapter9	2.5 Mass spectroscopy 2.6 Isotropic mass	Theoretical	General questions +Exam
11	**2 hours**	Chapter10	The atomic view of radiation 3.1 Waves or particles 3.2 Electricity and light	Theoretical	General questions +Exam
12	**2 hours**	Chapter11	3.3 Electrodynamics 3.4 Thermal radiation	Theoretical	General questions +Exam
13	**2 hours**	Chapter12	3.5 Emission and absorption of radiation 3.6 Black body radiation	Theoretical	General questions +Exam
14	**2 hours**	Chapter1	3.7 Wien and Rayleish-Jeans law's 3.8 Plank's law (emission quantized)	Theoretical	General questions +Exam
15	**2 hours**	Chapter13	3.9 Stefan-Boltzman law and Wien displacement law 3.10 Photoelectric effect	Theoretical	General questions +Exam
16	**2 hours**	Chapter14	**Final Exam**	Theoretical	

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)	**M. Russell Wehr and James A. Richards "The physics of the atom"** **2- Richard T. Wridner and Robert L. Sells "Elementry modern physics"** **3- M.C. Lovell and A. J. Avery "Physcal properties of material"**
Main references (sources)	**Modern Physics Books**
Recommended books and references (scientific journals, reports…)	none
Electronic References, Websites	**Modern Physics Websites**

Course Description Form

13. Course Name:	
Heat and Thermodynamic	
14. Course Code:	
PHY 2314	
15. Semester / Year:	
First semester /Second Stage	
16. Description Preparation Date:	
2024-4-2	
17.Available Attendance Forms:	
Weekly	
18.Number of Credit Hours (Total) / Number of Units (Total)	
30 hours	
19. Course administrator's name (mention all, if more than one name)	
Name: Dr.Hussein Khazal Rasheed Email: Hussein.k@sc.uobaghdad .edi.iq	
20. Course Objectives	
Course Objectives	Teaching students the basic principles of physics. 2. Prepa specialists in the field of general physics and its pract applications, which bears the responsibility of studying country's need for development and progress and capable meeting the needs of the job market in state institutions industry sectors. 3. Preparing an educated generation armed v science and adopts it as a sound basis to bring about rad changes and assign scientific knowledge and scientific meth in thinking, analysis and adaptation with the developmen technologies, to keep up with the expansion of human needs Effective contribution for deepening and documenting connection of the university with the society through implementation of advisory counseling, training and developn of teaching and administrative staff. 5. The service of prepa graduates specialized in physics who contribute to developn in the country. 6. Meeting the needs of various sectors with hig qualified personals in the field of physics. 7. Encouraging distinguished in this field to work as teaching assistants in department to be part of the academic teaching staff in the fut
21. Teaching and Learning Strategies	
Strategy	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students

22. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	**2 hours**	Chapter1	Temperature and the Zeroth Law of Thermodynamics Thermometers and the Celsius Temperature Scale	Theoretical	General questions +Exam
2	**2 hours**	Chapter2	The Constant-Volume Gas and the Absolute Temperatu Macroscopic Description of an Ideal Gas, Thermal Expansion of Solids and Liquids	Theoretical	General questions +Exam
3	**2 hours**	Chapter3	Thermodynamic equilibrium Hydrostatic systems Mathematical theorem	Theoretical	General questions +Exam
4	**2 hours**	Chapter4	Stretch wire, Surfaces ,Electrochemical cell, Dielectric slab, Paramagnetic rod Intensive and extensive coordinated	Theoretical	General questions +Exam
5	**2 hours**	Chapter5	Work,Quasi static process ,Work in changing volume of hydrostatic system P-V diagram	Theoretical	General questions +Exam
6	**2 hours**	Chapter6	Hydrostatic work depend on the path Calculation of $\int PdV$ for quasi- static process Quasi – static isothermal expansion or compression of an ideal gas Quasi static isothermal increase of pressure on a solid	Theoretical	General questions +Exam
7	**2 hours**		**Exam**	Theoretical	Exam
8	**2 hours**	Chapter7	Work in changing the length of a wire Work in changing the area of a surface film Work in moving charge with an electrochemical cell Work in changing total polarization of a dielectric solid	Theoretical	General questions +Exam

			Work in changing the total magnetization of a paramagnetic solid		
9	**2 hours**	Chapter8	Application of the first law of thermodynamics Energy of an isolated system Specific heat Joules law	Theoretical	General questions +Exam
10	**2 hours**	Chapter9	Relation between the two specific heats Ratio of the specific heats Expression for work	Theoretical	General questions +Exam
11	**2 hours**	Chapter10	Relations between Tand V , and T and P Reversible adiabatic process Derive PV^{γ} = constant Free expansion	Theoretical	General questions +Exam
12	**2 hours**	Chapter11	Conservation of energy : calorimetry Latent Heat Energy Transfer Mechanisms: Thermal conduction Convection Radiation	Theoretical	General questions +Exam
13	**2 hours**	Chapter12	The Kinetic Theory of Gases Molecular Model of an Ideal Gas Molar Specific Heat of an Ideal Gas Distribution of Molecular Speeds	Theoretical	General questions +Exam
14	**2 hours**	Chapter1	The Equipartition of Energy Adiabatic Processes for an Ideal Gas	Theoretical	General questions +Exam
15	**2 hours**	Chapter13	The Boltzmann Distribution Law Mean Free Paths	Theoretical	General questions +Exam
16	**2 hours**	Chapter14	**Exam**	Theoretical	

23. Course Evaluation	
Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc	
24. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Mark Waldo Zemansky_ Richard Dittma Heat and thermodynamics _ an intermedi textbook (1997, McGraw-Hill
Main references (sources)	None
Recommended books and references (scientific journals, reports…)	none
Electronic References, Websites	none

Course Description Form

1. Course Name:
Analytical Mechanics (1)
2. Course Code:
PHY 2315
3. Semester / Year:
First semester /Second Stage
4. Description Preparation Date:
2024-4-2
5. Available Attendance Forms:
Weekly
6. Number of Credit Hours (Total) / Number of Units (Total)
30 hours
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Raad Mohammed Email: raad.m@sc.uobaghdad.edu.iq
8. Course Objectives

Course Objectives	Teaching students the basic principles of physics. 2. Preparing specialists in the field of general physics and its practical applications, which bears the responsibility of studying the country's need for development and progress and capable of meeting the needs of the job market in state institutions and industry sectors. 3. Preparing an educated generation armed with science and adopts it as a sound basis to bring about radical changes and assign scientific knowledge and scientific methods in thinking, analysis and adaptation with the development of technologies, to keep up with the expansion of human needs. 4. Effective contribution for deepening and documenting the connection of the university with the society through the implementation of advisory counseling, training and development of teaching and administrative staff. 5. The service of preparing graduates specialized in physics who contribute to development in the country. 6. Meeting the needs of various sectors with highly qualified personals in the field of physics. 7. Encouraging the distinguished in this field to work as teaching assistants in the department to be part of the academic teaching staff in the future.

9. Teaching and Learning Strategies	
Strategy	Type something like: The main strategy that will be adopted in delivering this module i encourage students' participation in the exercises, while at the same time refining and expanc their critical thinking skills. This will be achieved through classes, interactive tutorials anc considering types of simple experiments involving some sampling activities that are interes to the students

10. Course Structure

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

1	**2 hours**	Chapter1	Vectors, the Scalar Product and Vector Product, Moment of a Force, Triple Products, the Transformation Matrix.	Theoretical	General questions +Exam
2	**2 hours**	Chapter2	Derivative of a Vector, Position Vector of a Particle, Velocity and Acceleration in Rectangular Coordinates.	Theoretical	General questions +Exam
3	**2 hours**	Chapter3	Velocity and Acceleration in Plane Polar Coordinates, Cylindrical and Spherical Coordinates, Newton's Law of Motion.	Theoretical	General questions +Exam
4	**2 hours**	Chapter4	Rectilinear Motion: Uniform Acceleration Under a Constant Force, Forces that Depend on Position: The Concepts of Kinetic and Potential Energy.	Theoretical	General questions +Exam
5	**2 hours**	Chapter5	Velocity-Dependent Forces: Fluid Resistance and Terminal Velocity, Vertical Fall Through a Fluid: Numerical Solution.	Theoretical	General questions +Exam
6	**2 hours**	Chapter6	General motion of particle in 3D, 2D, The Potential Energy Function in Three-Dimensional Motion: The Del Operator.	Theoretical	General questions +Exam
7	**2 hours**		**Exam**	Theoretical	Exam
8	**2 hours**	Chapter7	Forces of the Separable Type: Projectile Motion, The Harmonic Oscillator in Two and Three Dimensions, Motion of Charged Particles in Electric and Magnetic Fields.	Theoretical	General questions +Exam
9	**2 hours**	Chapter8	Constrained Motion of a Particle, Noninertial Reference Systems, Accelerated Coordinate Systems and Inertial Forces.	Theoretical	General questions +Exam
10	**2 hours**	Chapter9	Rotating Coordinate Systems. Dynamics of a Particle in a Rotating Coordinate System, Effects of Earth's Rotation.	Theoretical	General questions +Exam

11	**2 hours**	Chapter10	Motion of a Projectile in a Rotating Cylinder, The Foucault Pendulum, Gravitation and Central Forces.	Theoretical	General questions +Exam
12	**2 hours**	Chapter11	Gravitational Force between a Uniform Sphere and a Particle, Kepler's Laws of Planetary Motion.	Theoretical	General questions +Exam
13	**2 hours**	Chapter12	Kepler's Second Law: Equal Areas Kepler's First Law: The Law of Ellipses, Kepler's Third Law: The Harmonic Law.	Theoretical	General questions +Exam
14	**2 hours**	Chapter1	Potential Energy in a Gravitational Field: Gravitational Potential, Potential Energy in a General Central Field.	Theoretical	General questions +Exam
15	**2 hours**	Chapter13	Orbital Energies in an Inverse-Square Field, Energy Equation of an Orbit in a Central Field.	Theoretical	General questions +Exam
16	**2 hours**	Chapter14	**Exam**	Theoretical	

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)	Analytical mechanics (Fowlus & Cassiday).
Main references (sources)	none
Recommended books and references (scientific journals, reports…)	none
Electronic References, Websites	none

Course Description Form

1. Course Name:
Analogue Electronics
2. Course Code:
PHY 2316
3. Semester / Year:
First semester /Second Stage
4. Description Preparation Date:
2024-4-2
5. Available Attendance Forms:
Weekly
6. Number of Credit Hours (Total) / Number of Units (Total)
30 hours
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Estabraq Talib Abdullah Email: Estabraqtalib@sc.uobaghdad.edu.iq
8. Course Objectives

Course Objectives	Teaching students the basic principles of physics. 2. Preparing specialists in the field of general physics and its practical applications, which bears the responsibility of studying the country's need for development and progress and capable of meeting the needs of the job market in state institutions and industry sectors. 3. Preparing an educated generation armed with science and adopts it as a sound basis to bring about radical changes and assign scientific knowledge and scientific methods in thinking, analysis and adaptation with the development of technologies, to keep up with the expansion of human needs. 4. Effective contribution for deepening and documenting the connection of the university with the society through the implementation of advisory counseling, training and development of teaching and administrative staff. 5. The service of preparing graduates specialized in physics who contribute to development in the country. 6. Meeting the needs of various sectors with highly qualified personals in the field of physics. 7. Encouraging the distinguished in this field to work as teaching assistants in the department to be part of the academic teaching staff in the future.

9. Teaching and Learning Strategies

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

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	**2 hours**	Chapter1	Intrinsic Semiconductor. - Extrinsic Semiconductor (N- and P-Type).	Theoretical	General questions +Exam
2	**2 hours**	Chapter2	P-N Junction (Diode) Construction - Biasing (forward and reverse); I-V Curve.	Theoretical	General questions +Exam
3	**2 hours**	Chapter3	The application of diodes (half wave and full wave rectifier).	Theoretical	General questions +Exam
4	**2 hours**	Chapter4	Clipper and clamber circuits	Theoretical	General questions +Exam
5	**2 hours**	Chapter5	Power Supply.	Theoretical	General questions +Exam
6	**2 hours**	Chapter6	Special diodes	Theoretical	General questions +Exam
7	**2 hours**		**Exam**	Theoretical	Exam
8	**2 hours**	Chapter7	Amplifications and Voltage Amplifiers - Definition of amplifications and gain - Basic Characteristics of an ideal voltage amplifiers - Amplifications elements:	Theoretical	General questions +Exam
9	**2 hours**	Chapter8	Transistor - Construction. - Transistor configurations	Theoretical	General questions +Exam
10	**2 hours**	Chapter9	Common emitter configurations :characteristic curves; - Hybrid parameters	Theoretical	General questions +Exam
11	**2 hours**	Chapter10	Load line analysis and Q-point. - Thermal stability and basic circuits. - Analysis of divider self-biased circuit voltage	Theoretical	General questions +Exam
12	**2 hours**	Chapter11	Small signal common emitter voltage amplifier. - Properties of other transistor configurations. - Transistor as a switch	Theoretical	General questions +Exam
13	**2 hours**	Chapter12	Field Effect Transistor (FET) Junction Field Effect Transistor (JFET) -	Theoretical	General questions +Exam

			Construction. - Circuits - Common drain circuits : Characteristic Curves - JFET small signal parameters - Biasing circuits and bias line analysis - Voltage amplifier and calculations of gain		
14	**2 hours**	Chapter1	Metal Oxide Semiconductor Field Effect Transistor (MOSFET) - Depletion Type (D-MOSFET) and Construction.	Theoretical	General questions +Exam
15	**2 hours**	Chapter13	Modes of operations , Characteristic Curves , Bias Circuits and Applications	Theoretical	General questions +Exam
16	**2 hours**	Chapter14	**Final Exam**	Theoretical	

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)	Electronic devices by Thomas L. Floyed
Main references (sources)	Electronic and instrumentation by Gupta
Recommended books and references (scientific journals, reports…)	none
Electronic References, Websites	none

Course Description Form

1. Course Name:
Crime of the Baath regime in Iraq
2. Course Code:
UOB 206
3. Semester / Year:
First semester /Second Stage
4. Description Preparation Date:
2024-4-2
5. Available Attendance Forms:
Weekly
6. Number of Credit Hours (Total) / Number of Units (Total)
30 hours
7. Course administrator's name (mention all, if more than one name)
Name: **Mohanad Ahmed Yaseen** Email: mohannad.ahmed@sc.uobaghdad.edu.iq
8. Course Objectives

Course Objectives	**1**-ان الأجيال الحالية لم تعيش فترة الدكتاتورية والكثير منهم لايعرف معاناة الشعب والجرائم التي ارتكبها النظام المقبور. **2**-بيان مدى سوء حكم النظام الشمولي والذي لم يقتصر فقط على داخل العراق بل على دول المجاور له **3**-توعية الطلبة على الأضرار الكبيرة التي احدثها النظام البائد والجرائم التي ارتكبها بحق الشعب العراقي. **4**-أظهار الاضرار الاقتصادية والاجتماعية والتنموية التي أحدثها النظام السابق. **5**-بيان مدى وحشية النظام البائد والإعدامات الجماعية. **6**-بيان الاساليب القمعية التي مارسها النظام البائد والتهجير القصري. **7**-كبح الحريات العامة وتدهور مستوى الاعلام والثقافة. **8**-توضيح الأضرار البيئية والزراعية التي ظهرت آثارها في السنوات السابقة والحالية. **9**-بيان مدى سوء حكم النظام الشمولي والذي لم يقتصر فقط على داخل العراق بل على دول المجاورة ايضا. **10**-ان الهدف من تدريس هذه المادة لمعرفة تاريخ تلك الحقبة السوداء. **11**-الهدف من هذه المادة ان الحكم في العراق لن يدوم باستخدام أدوات العنف والقوة مهما كانت مفرطة .والعراق يجب ان يحكم بنظام

سياسي يحترم العراقيين ومعتقدات ودياناتهم وقومياتهم وان يؤمن بالتعدد في المجتمع العراقي	

9. Teaching and Learning Strategies

Strategy	**1-**التعرف على الجرائم النظام البائد في كبح الحريات العامة **2-**دراسة الانظمة السياسية في العراق نبذة تاريخية **3-**معرفة ابرز انتهاكات النظام البعثي للحقوق والحريات **4-**معرفة اثر سلوكيات النظام البعثي المقبور على المجتمع العراقي **5-**التوضيح للاجيال الحالية حقيقة حقبة تاريخية سوداء في تأريخ العراق المعاصر التي شهدت الظلم والاستبداد **6-**الاطلاع على وحشية واستبداد وقمع النظام البائد للشعب العراقي **7-**معرفة ان الظلم والاستبداد والحكم الدكتاتوري لن يدوم مهما كانت قسوته **8-**تعليم الطلبة وارشادهم على النظام السياسي الصحيح لحكم هذا الشعب الطيب. والذي يجب ان يبتعد عن الدكتاتورية والظلم وان يكون مبنى على العدالة واحترام التعددية الدينية والمذهبية والقومية **9-**توعية الطلبة الى حجم الدمار والتلوث البيئي الذي احدثته الحروب واستخدام اسلحة محرمة دوليا **10-**بيان مدى قسوة النظام البعثي وقمعه للشعب والمقابر الجماعية التي ضمت رفاة آلاف الشهداء الأبرياء **11-**توعية الطلبة الى ماقام به النظام السابق من تهجير ابناء هذا البلد وكفائته العلمية والادبية

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	**2 hours**	Chapter1	مقدمة عن انتهاكات الحقوق والحريات	2 ساعة	1
2	**2 hours**	Chapter2	نبذة وصفية عن الانظمة السياسية في العراق	2 ساعة	2
3	**2 hours**	Chapter3	انتهاكات النظام البعثي للحقوق والحريات العامة	2 ساعة	3
4	**2 hours**	Chapter4	اثر سلوكيات النظام البعثي في المجتمع وتسلطه على الدولة	2 ساعة	4
5	**2 hours**	Chapter5	اثر المرحلة الانتقالية في محاربة السياسة الاستبدادية	2 ساعة	5
6	**2 hours**	Chapter6	الميدان النفسي والاجتماعي	2 ساعة	6
7	**2 hours**		**Exam**	2 ساعة	7
8	**2 hours**	Chapter7	الدين والدولة	2 ساعة	8

9	**2 hours**	Chapter8	عسكرة المجتمع والثقافة والاعلام	2 ساعة	9
10	**2 hours**	Chapter9	اثر القمع والحروب على البيئة والسكان	2 ساعة	10
11	**2 hours**	Chapter10	التلوث البيئي واستعمال الاسلحة المحرمة دوليا	2 ساعة	11
12	**2 hours**	Chapter11	سياسة الارض المحروقة وتجفيف الاهوار	2 ساعة	12
13	**2 hours**	Chapter12	المقابر الجماعية وتدمير البيئة الزراعية	2 ساعة	13
14	**2 hours**		**final Exam**	2 ساعة	14

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)	ح جرائم حزب البعث البائد 2023/جمهورية العراق/وزارة التعليم العالي والبحث العلمي/دائرة الدراسات والتخطيط
Main references (sources)	None
Recommended books and references (scientific journals, reports…)	None
Electronic References, Websites	Wikipedia

Course Description Form

1. Course Name:	
English Language (2)	
2. Course Code:	
UOB 206	
3. Semester / Year:	
First semester /Second Stage	
4. Description Preparation Date:	
2024-4-2	
5. Available Attendance Forms:	
Weekly	
6. Number of Credit Hours (Total) / Number of Units (Total)	
30 hours	
7. Course administrator's name (mention all, if more than one name)	
Name: Dr. Muthana Hameed Khalaf Email: muthana.khalaf@sc.uobaghdad.edu.iq	
8. Course Objectives	
Course Objectives	a pre-intermediate level course aiming to build and further improve language proficiency for second year students/ college of science, 1. Listening Objectives: • Understand and respond appropriately to a variety of spoken English in familiar contexts. • Comprehend main ideas, specific details, and implied information in spoken texts. • Develop listening strategies to enhance understanding. 2. Speaking Objectives: • Engage in conversations on a range of topics using appropriate vocabulary and grammar. • Express opinions, preferences, and experiences. • Develop speaking strategies for effective communication, such as turn-taking and seeking clarification. 3. Reading Objectives: • Read and understand a variety of texts, including articles, stories, and informational passages. • Comprehend main ideas, details, and implied information in written texts. • Develop reading strategies for comprehension and vocabulary acquisition. 4. Writing Objectives: • Write coherent paragraphs and short texts on different topics. • Express ideas clearly and logically using appropriate grammar and vocabulary.

	• Develop writing strategies for organization, coherence, and accuracy. 5. Grammar and Vocabulary Objectives: • Develop a solid understanding and usage of a wide range of grammatical structures appropriate for the pre-intermediate level. • Expand vocabulary knowledge to include a broader range of words, idiomatic expressions, and collocations. • Apply grammar and vocabulary knowledge to express oneself accurately and effectively. • Pronunciation and Intonation Objectives: • Improve pronunciation accuracy of individual sounds, stress patterns, and intonation. • Use appropriate rhythm, stress, and intonation for effective communication. • Recognize and produce connected speech features to enhance fluency and naturalness. • Cultural Awareness Objectives: • Develop an understanding of cultural practices, customs, and social norms in English-speaking countries. • Demonstrate cultural sensitivity and adapt communication accordingly. • Recognize the impact of culture on language use and communication styles.
9. Teaching and Learning Strategies	
Strategy	Learner training is essential to the achievement of the Learning Outcomes. 1. Listening and Speaking: • Understand and respond appropriately to a range of everyday spoken English in familiar contexts. • Engage in conversations and discussions on a variety of topics using appropriate language and strategies. • Comprehend and extract information from spoken texts, such as interviews, dialogues, and narratives. 2. Reading: • Read and understand a variety of texts, including articles, stories, and informational passages. • Comprehend main ideas, details, and specific information from the texts. • Apply reading strategies to infer meaning from context and make predictions. 3. Writing: • Write coherent and well-organized paragraphs and short texts on various topics. • Express ideas and opinions clearly and concisely. • Demonstrate control of grammar, vocabulary, and sentence structures appropriate for the pre-intermediate level. 4. Grammar and Vocabulary:

	• Understand and use a wide range of grammatical structures and tenses, including present perfect, past simple, future forms, and conditionals. • Expand vocabulary knowledge to include a broader range of words, idiomatic expressions, and collocations. • Apply grammar and vocabulary in context to enhance communication skills. • Pronunciation and Intonation: • Develop accurate pronunciation of individual sounds and common word stress patterns. • Use appropriate intonation and stress patterns to convey meaning effectively. • Understand and produce connected speech features, such as linking sounds and contractions. • Cultural Awareness: • Gain insights into cultural practices, traditions, and customs in English-speaking countries. • Develop intercultural competence and sensitivity in communication. • Understand cultural influences on language use and behavior.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	**2 hours**	Chapter1	Getting to know you p6 **Tenses** *Present, past, future* p6 Questions *Where were you born?* *What do you do?* p6 Question words *Who …?, Why …?,* *How much …?* p7 **Right word, wrong word** Verbs of similar meaning *speak/talk, say/tell* Adjectives and nouns that go together Prepositions *to, from, at, about, of, on, in,* etc. Words with two meanings *I met my husband on a blind date.* *Dates are good for you.* p12 **Social expressions** *Have a good weekend!* *Same to you.* p13	Theoretical	General questions +Exam
2	**2 hours**	Chapter2	Whatever makes you happy p14	Theoretical	General questions +Exam

			Present tenses Present Simple *She lives alone in Bristol.* p14 Present Continuous *She's planning …* p14 *have/have got* *He has his own company.* *I've got an idea for …* p15 **Things I like doing** *play games* *have a lie-in* *get up late* p17 **Making conversation** *What a lovely day it is today!* *Are you having a good time in London?* *Have a good weekend!* p21		
3	**2 hours**	Chapter3	What's in the news? p22 **Past tenses** Past Simple *How far did he walk?* *I had a shower last night.* p23 Past Continuous *I was having a shower when …* p23 **Adverbs** *drive carefully* *speak furiously* *work hard* p28 **Saying when** *What's the date today?* *It's June the twentysecond.* *When did you last go to the cinema?* *Two weeks ago.* p29	Theoretical	General questions +Exam
4	**2 hours**	Chapter4	Eat, drink, and be merry! p30 **Quantity** *much* and *many* *How much milk?* *How many eggs?* p31 *some* and *any* *some apples, any bananas* p31 *a few, a little, a lot/lots of* p31 *something / someone / somewhere* p32 Articles *a shopkeeper, an old village,* *the north of England, He came* *by bus.* p32	Theoretical	General questions +Exam

			Food *apples, beer, bread, cake* p36 **Shopping** *newsagent's, chemist's, off-licence* p36 **Can you come for dinner?** *Would you like some more rice?* *Could you pass the salt, please?* *How would you like your coffee?* *This is delicious!* p37		
5	**2 hours**	Chapter5	Looking forward p38 **Verb patterns** *want/hope to do* *like/enjoy doing* *looking forward to doing* *'d like to* p38 **Future forms** *going to*, *will* and Present Continuous *I'm going to stay with a friend.* *I'll call or text you.* *I'm working late this evening.* p40 **Phrasal verbs – literal** *move back* *take away* *grow up* p44 **Phrasal verbs – idiomatic** *give up* *take off* *look after* p44 **Expressing doubt and certainty** *Of course he will.* *He might do.* *Mmm … maybe.* *I doubt it.* *No chance.* p45	Theoretical	General questions +Exam
6	**2 hours**	Chapter6	The way I see it p46 ***What … like?*** *What's your teacher like?* p46 **Comparative and superlative adjectives** *big, bigger, biggest* *good, better, best* p47 *as … as* *It isn't as hot as Dubai.* p47 **Relative pronouns** *who/that/which/where* p110 **Synonyms and antonyms** *lovely, beautiful* *brilliant, terrible* p52 **What's on?**	Theoretical	General questions +Exam

			How much is it to go in the museum? *Is it open on Sunday?* *What film is suitable for children?* p53		
7	**2 hours**		**Exam**	Theoretical	Exam
8	**2 hours**	Chapter7	Living history p54 **Present Perfect** *John has lived there for three years.* p55 *for* and *since* *for two hours* *since six o'clock* p55 *ever* and *never* *Have you ever been …?* *I've never been to South America.* p56 **Present Perfect or Past Simple** *Have you had an ordinary job?* *I worked in a restaurant.* p57 **Word endings** Jobs *philosopher, historian, economist* p57 Nouns and adjectives *competition, famous* p57 **Word stress** *danger, dangerous* *invite, invitation* p57 **Agree with me!** *It's wonderful, isn't it?* *You come from Scotland, don't you?* *It wasn't easy, was it?* *You've lived here for years, haven't you?* p61	Theoretical	General questions +Exam
9	**2 hours**	Chapter8	Girls and boys p62 ***have to*** *She has to train hard.* *I don't have to train every day.* *Do you have to work at weekends?* p63 ***should*** *You should show him this letter.* p64 ***must*** *He must get professional help.* p64 **Things to wear** *belt, cap, boots, jumper, make-up* p68 Materials *leather, wool, denim,*	Theoretical	General questions +Exam

			cotton p68 Situations *job interview, party, beach holiday* p68 **At the doctor's** *a sore throat, flu, food poisoning* *I've got a fever.* *My body aches.* *My glands are swollen.* p69		
10	**2 hours**	Chapter9	Time for a story p70 **Past Perfect** *They had walked twenty miles.* p71 **Narrative tenses** *They saw a bear.* *They were looking for work.* p71 **Joining sentences** *although, because when, while, before, after, as, until, as soon as* p72 **Feelings** *angry, nervous, delighted, stressed* p76 **Exclamations with so and such** *I was so scared!* *It was such a shock!* *We had such terrible weather!* *I've got so much work!* p77	Theoretical	General questions +Exam
11	**2 hours**	Chapter10	Our interactive world p78 **Passives** *Mobile phones are used by almost 6 billion people.* *The first mobile phone call was made in 1973.* *Camera phones have been sold since 2002.* *Landline telephones will be replaced by mobile phones.* p79 **Words that go together** Noun + noun *text message, businessman* p81 Verb + noun *take notes, send a text message* p81 Adverb + adjective *well-known,*	Theoretical	General questions +Exam

			badly-behaved p81 **On the phone** *07700 900333* *Can I speak to Patrick, please?* *I'm calling because ...* *Sorry, you're breaking up ...* p85		
12	**2 hours**	Chapter11	Life's what you make it! p86 **Present Perfect Continuous** *He's been making programmes since 2007.* *How long has she been working there?* p87 Present Perfect Simple versus Continuous *He's made three programmes.* *He's been teaching for three years.* p87 **Birth, marriage, death** *pregnant, born* *engaged, divorced* *funeral, died of* p92 **Good news, bad news** *Congratulations!* *That's fantastic news!* *What a shame!* *I'm so sorry.* p93	Theoretical	General questions +Exam
13	**2 hours**	Chapter12	Just wondering ... p94 **First conditional *if* + *will*** *If it's sunny, we'll go for a picnic.* *We won't go out if it rains.* p95 *going to* and *might* *What are you going to do tonight?* *I might go out ...* p95 **Second conditional *if* + *would*** *If I had a brother, I'd play with him.* *If I were you, I'd stop smoking.* p96 **Prepositions** *connected to* *on a date* *listen to* *think about* p100 **Thank you and goodbye!** *It's late. I must be going now.* *Thank you for a lovely*	Theoretical	General questions +Exam

			evening. *My pleasure!* p101		
14	**2 hours**	Chapter1	**Living in a stately home** *Living history* Chatsworth House and the family who call it home p58 **A family history** David Taylor Bews from Perth, Australia researches his family history p60 **What do you think?** Stately homes Aristocracy Inherited wealth p58 **Talking about you** Have you ever ...? p57 The lives of your grandparents p60 **What do you think?** Family history p60 **A biography** Ordering paragraphs: Two Kennedys Researching facts about a famous person and writing a biography p111	Theoretical	General questions +Exam
15	**2 hours**	Chapter13	**Families with all boys or all girls** *Sons and daughters* The parents of four daughters swap homes with the parents of four sons p66 **Heptathlon champion** An interview with Jessica Ennis – Britain's first world heptathlon champion p65 **What do you think?** Talking about successful people p65 Pros and cons of all-girl or all-boy families The ideal family p66 **Dress person X** Describing an outfit p68 **Letters and emails** Formal and informal expressions *Dear Sir or Madam,* *Yours sincerely,* *Hi Cathy,* *Love Steve* Writing a formal letter to a language school and an email to an English friend p112	Theoretical	General questions +Exam

16	**2 hours**	Chapter14	**Final Exam**	Theoretical	

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)	The core textbook is *Soars, John and Liz, (2011), New Headway Plus Pre-Intermediate Student's Book, Special Edition, Oxford University Press*
Main references (sources)	New Headway Plus provides an integrated skills course with each unit divided into grammar, vocabulary, skills work and everyday English segments
Recommended books and references (scientific journals, reports…)	none
Electronic References, Websites	Oxford University Press: The New Headway series is published by Oxford University Press. Visit their website at www.oup.com and search for "New Headway Plus, Special Edition, pre-Intermediate" or browse their English language teaching section for information on the course.

Course Description Form

1. Course Name:
Arabic Language (2)
2. Course Code:
UOB 205
3. Semester / Year:
First semester /Second Stage
4. Description Preparation Date:
2024-4-2
5. Available Attendance Forms:
Weekly
6. Number of Credit Hours (Total) / Number of Units (Total)
30 hours
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Leqaa faleh owdaa Email: leqaa.falih@ircoedu.uobaghdad.edu.iq
8. Course Objectives

Course Objectives	**1-تعلم مهارات الكتابة والاملاء والتعبير الصحيح خلال تطبيق قواعد اللغة العربية بشكل مفصل وتطبيقي على نصوص عربية.** **2- لفهم الجمع وأنواع الاسماء وكيفية التعامل معها.** **3- لفهم العدد واستعماله بشكل صحيح من حيث المطابقة والمخالفة للتفريق بين الضاد والظاء.** **4- للتفريق ومعرفة استعمال التاء المربوطة والتاء الطويلة.** **5-التمييز بين العلامات الاصلية والفرعية.** **6- تعلم استعمال الأدوات وعمل كل أداة ومعناها في التعبير.**

9. Teaching and Learning Strategies

Strategy	**هام: اكتب 6 مخرجات تعليمية على الأقل، ومن الأفضل أن تكون مساوية لعدد أسابيع الدراسة** **1-التعرف على كيفية جمع الأسماء وأنواع الجموع وسبب اختلافها وقائمة بالمصطلحات المختلفة المرتبطة ببلاغة اللغة العربية تعلم كتابة الهمزة وانواعها.** **2-وصف عمل الجمل الفعلية وأنواع الافعال**

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	**2 hours**	Chapter1	**علامات الترقيم والتنقيط والنواسخ**	Theoretical	General questions +Exam

2	**2 hours**	Chapter2	**المشتقات.**	Theoretical	General questions +Exam
3	**2 hours**	Chapter3	**الجملة الاسمية**	Theoretical	General questions +Exam
4	**2 hours**	Chapter4	**الجملة الفعلية**	Theoretical	General questions +Exam
5	**2 hours**	Chapter5	**الفرق بين الضاد والظاء**	Theoretical	General questions +Exam
6	**2 hours**	Chapter6	**التاء المربوطة والتاء المفتوحة**	Theoretical	General questions +Exam
7	**2 hours**		**Exam**	Theoretical	Exam
8	**2 hours**	Chapter7	**الهمزة وانواعها العدد**	Theoretical	General questions +Exam
9	**2 hours**	Chapter8	**الجمع**	Theoretical	General questions +Exam
10	**2 hours**	Chapter9	**العلامات الاصلية والعلامات الفرعية**	Theoretical	General questions +Exam
11	**2 hours**	Chapter10	**اعلام عراقيون بدر شاكر السياب والجواهري**	Theoretical	General questions +Exam
12	**2 hours**	Chapter11	**العطف**	Theoretical	General questions +Exam
13	**2 hours**	Chapter12	**حروف الجر**	Theoretical	General questions +Exam
14	**2 hours**	Chapter1	**الاسم المؤنث والاسم المذكر**	Theoretical	General questions +Exam
15	**2 hours**	Chapter13	**الحذف والزيادة, الأسماء المنصوبة**	Theoretical	General questions +Exam
16	**2 hours**	Chapter14	**Final Exam**	Theoretical	

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)	جامع الدروس العربية وشرح ابن عقيل

Main references (sources)	Electromagnetic theory (book). 2000.vol.1
Recommended books and references (scientific journals, reports…)	none
Electronic References, Websites	none

Course Description Form

1. Course Name:
Mathematic III
2. Course Code:
PMa 207
3. Semester / Year:
First semester /Second Stage
4. Description Preparation Date:
2024-4-2
5. Available Attendance Forms:
Weekly
6. Number of Credit Hours (Total) / Number of Units (Total)
30 hours
7. Course administrator's name (mention all, if more than one name)
Name: Dr. zainab hadi Mahmood Email: zainab.mahmood@sc.uboghdad.edu.iq:
8. Course Objectives

Course Objectives	Teaching students the basic principles of physics. 2. Preparing specialists in the field of general physics and its practical applications, which bears the responsibility of studying the country's need for development and progress and capable of meeting the needs of the job market in state institutions and industry sectors. 3. Preparing an educated generation armed with science and adopts it as a sound basis to bring about radical changes and assign scientific knowledge and scientific methods in thinking, analysis and adaptation with the development of technologies, to keep up with the expansion of human needs. 4. Effective contribution for deepening and documenting the connection of the university with the society through the implementation of advisory counseling, training and development of teaching and administrative staff. 5. The service of preparing graduates specialized in physics who contribute to development in the country. 6. Meeting the needs of various sectors with highly qualified personals in the field of physics. 7. Encouraging the distinguished in this field to work as teaching assistants in the department to be part of the academic teaching staff in the future.

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

10. Course Structure

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

1	**2 hours**	Concept of function and inverse function	Concept of function and inverse function	Theoretical	General questions +Exam
2	**2 hours**	The logarithm function and exponential function	The logarithm function and exponential function	Theoretical	General questions +Exam
3	**2 hours**	A review for the derivatives' laws, and add the definitions of the trigonometric functions and the inverse of trigonometric functions with their derivatives	derivatives	Theoretical	General questions +Exam
4	**2 hours**	Solve some examples on the subject (A review for the derivatives' laws, and add the definitions of the trigonometric functions and the inverse of trigonometric functions with their derivatives)	derivatives	Theoretical	General questions +Exam
5	**2 hours**	Hyperbolic functions and the inverse of Hyperbolic functions with their derivatives	Hyperbolic functions	Theoretical	General questions +Exam
6	**2 hours**	Solve some examples on the subject "Hyperbolic functions and the inverse of Hyperbolic functions with their derivatives"	Hyperbolic functions	Theoretical	General questions +Exam
7	**2 hours**	Integration	Integration	Theoretical	Exam
8	**2 hours**		**exam**	Theoretical	General questions +Exam

9	**2 hours**	Application of finite Integration	Application of finite Integration	Theoretical	General questions +Exam
10	**2 hours**	Application of finite Integration	Application of finite Integration	Theoretical	General questions +Exam
11	**2 hours**	Integration methods by part	Integral	Theoretical	General questions +Exam
12	**2 hours**	Integration methods by partial fraction (part 1)	Integral	Theoretical	General questions +Exam
13	**2 hours**	Integration methods by partial fraction (part 2)	Integral	Theoretical	General questions +Exam
14	**2 hours**	Integration methods power Trigonometric		Theoretical	General questions +Exam
15	**2 hours**	example	integral	Theoretical	General questions +Exam
16	**2 hours**		**exam**	Theoretical	

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)	المحاضرات المطبوعة من قبل مدرس المادة كتب الرياضيات
Main references (sources)	كتاب الرياضيات (Thomas _ calculus) التفاضل والتكامل والهندسة التحليلية : تأليف توماس حسبان التفاضل والتكامل : تأليف برسل
Recommended books and references (scientific journals, reports…)	1 .Stewart. J. "Calculas", 7th Edition, 2012. 2 .Thomas. G. B. & Finney. R. L., "Calcu and Analytic Geometry", 6th Editi 1984.
Electronic References, Websites	

Course Description Form

1. Course Name:
Analogue Electronics / Lab.
2. Course Code:
PHY 2316
3. Semester / Year:
First semester /Second Stage
4. Description Preparation Date:
2024-4-2
5. Available Attendance Forms:
Weekly
6. Number of Credit Hours (Total) / Number of Units (Total)
30 hours
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Estabraq Talib Abdullah Email: Estabraqtalib@sc.uobaghdad.edu.iq
8. Course Objectives

Course Objectives	Teaching students the basic principles of physics. 2. Preparing specialists in the field of general physics and its practical applications, which bears the responsibility of studying the country's need for development and progress and capable of meeting the needs of the job market in state institutions and industry sectors. 3. Preparing an educated generation armed with science and adopts it as a sound basis to bring about radical changes and assign scientific knowledge and scientific methods in thinking, analysis and adaptation with the development of technologies, to keep up with the expansion of human needs. 4. Effective contribution for deepening and documenting the connection of the university with the society through the implementation of advisory counseling, training and development of teaching and administrative staff. 5. The service of preparing graduates specialized in physics who contribute to development in the country. 6. Meeting the needs of various sectors with highly qualified personals in the field of physics. 7. Encouraging the distinguished in this field to work as teaching assistants in the department to be part of the academic teaching staff in the future.

9. Teaching and Learning Strategies

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

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	**6 hours**	**none**	Introduction of Analog Equipment's	Practical	General questions
2	**6 hours**	**none**	Introduction of Analog Electronic Components	Practical	Solve on the board
3	**6 hours**	**none**	STUDY OF THE CHARACTERISTICS OF A DIODE AND THE CHARECTERISTIC OF ZENER DIODE (Part 1)	Practical	Graph paper exam
4	**6 hours**	**none**	STUDY OF THE CHARACTERISTICS OF A DIODE AND THE CHARECTERISTIC OF ZENER DIODE (Part 2)	Practical	Daily exam and assessment report
5	**6 hours**	**none**	Power Supply - Half Rectifier	Practical	Daily exam and assessment report
6	**6 hours**	**none**	Power Supply - Full Rectifier	Practical	Daily exam and assessment report
7	**6 hours**	**none**	**Exam**	Practical	Daily exam and assessment report
8	**6 hours**	**none**	TRANSISTOR COMMON EMITTER CHARACTERISTICS	Practical	Daily exam and assessment report
9	**6 hours**	**none**	TRANSISTOR COMMON EMITTER CHARACTERISTICS (Part 1)	Practical	Daily exam and assessment report
10	**6 hours**	**none**	TRANSISTOR COMMON EMITTER CHARACTERISTICS (Part 2)	Practical	Daily exam and assessment report
11	**6 hours**	**none**	TRANSISTOR COMMON EMITTER CHARACTERISTICS (Output Circuit) (Part 1)	Practical	Daily exam and assessment report
12	**6 hours**	**none**	TRANSISTOR COMMON EMITTER CHARACTERISTICS (Output Circuit) (Part 2)	Practical	Daily exam and assessment report

13	**6 hours**	**none**	TRANSISTOR COMMON EMITTER CHARACTERISTICS (Input Circuit)	Practical	Daily exam
14	**6 hours**	**none**	DESIGN OF A COMMON EMITTER AMPLIFIER (Part 1)	Practical	Exam
15	**6 hours**	**none**	DESIGN OF A COMMON EMITTER AMPLIFIER (Part 2)	Practical	Exam
16	**6 hours**	**none**	**Final Exam**	Practical	

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)	Electronic devices by Thomas L. Floyed
Main references (sources)	Electronic and instrumentation by Gupta
Recommended books and references (scientific journals, reports…)	none
Electronic References, Websites	none

Course Description Form

1. Course Name:
Heat and Thermodynamic/ lab.
2. Course Code:
PHY 2314
3. Semester / Year:
First semester /Second Stage
4. Description Preparation Date:
2024-4-2
5. Available Attendance Forms:
Weekly
6. Number of Credit Hours (Total) / Number of Units (Total)
30 hours
7. Course administrator's name (mention all, if more than one name)
Name: Dr.Hussein Khazal Rasheed Email: Hussein.k@sc.uobaghdad .edi.iq
8. Course Objectives

Course Objectives	Teaching students the basic principles of physics. 2. Preparing specialists in the field of general physics and its practical applications, which bears the responsibility of studying the country's need for development and progress and capable of meeting the needs of the job market in state institutions and industry sectors. 3. Preparing an educated generation armed with science and adopts it as a sound basis to bring about radical changes and assign scientific knowledge and scientific methods in thinking, analysis and adaptation with the development of technologies, to keep up with the expansion of human needs. 4. Effective contribution for deepening and documenting the connection of the university with the society through the implementation of advisory counseling, training and development of teaching and administrative staff. 5. The service of preparing graduates specialized in physics who contribute to development in the country. 6. Meeting the needs of various sectors with highly qualified personals in the field of physics. 7. Encouraging the distinguished in this field to work as teaching assistants in the department to be part of the academic teaching staff in the future.

9. Teaching and Learning Strategies

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

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	6 hours	none	Introduction to the laboratory experiments	Practical	Practical
2	6 hours	none	Measuring the true expansion coefficient of water	Practical	Practical
3	6 hours	none	Measuring the apparent expansion coefficient of water	Practical	Practical
4	6 hours	none	Measuring the coefficient of linear expansion of metals	Practical	Practical
5	6 hours	none	The specific heat of a liquid by cooling method	Practical	Practical
6	6 hours	none	Thermal conductivity coefficient of a well-conductive material (Searl)	Practical	Practical
7	6 hours	none	**Exam**	Practical	Practical
8	6 hours	none	Thermal conductivity coefficient of a non-conducting material (Li disk)	Practical	Practical
9	6 hours	none	Calculating atmospheric pressure by Boyle's method	Practical	Practical
10	6 hours	none	Satisfying of Charles ' law of the dependence of temperature on volume at constant pressure	Practical	Practical
11	6 hours	none	Satisfying of Gay-Lussac Charles' law of the dependence of temperature on pressure at constant volume	Practical	Practical
12	6 hours	none	Calibration of the thermocouple and its use as a thermometer	Practical	Practical
13	6 hours	none	Determination of water vapor pressure curve	Practical	Practical
14	6 hours	none	Maxwell -Boltzmann distribution law	Practical	Practical
15	6 hours	none	Reviewing the experiments	Practical	Practical

16	**6 hours**	**none**	**Final Exam**	Practical	Practical

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)	Mark Waldo Zemansky_ Richard Dittma Heat and thermodynamics _ an intermedi textbook (1997, McGraw-Hill
Main references (sources)	none
Recommended books and references (scientific journals, reports…)	none
Electronic References, Websites	none

Course Description Form

1. Course Name:
Practical physics I(modern physics I)
2. Course Code:
PHY 2313
3. Semester / Year:
First semester /Second Stage
4. Description Preparation Date:
2024-4-2
5. Available Attendance Forms:
Weekly
6. Number of Credit Hours (Total) / Number of Units (Total)
30 hours
7. Course administrator's name (mention all, if more than one name)
Name: Samar Imran Essa Email: samar.o@sc.uobaghdad.edu.iq
8. Course Objectives

Course Objectives	Teaching students the basic principles of physics. 2. Preparing specialists in the field of general physics and its practical applications, which bears the responsibility of studying the country's need for development and progress and capable of meeting the needs of the job market in state institutions and industry sectors. 3. Preparing an educated generation armed with science and adopts it as a sound basis to bring about radical changes and assign scientific knowledge and scientific methods in thinking, analysis and adaptation with the development of technologies, to keep up with the expansion of human needs. 4. Effective contribution for deepening and documenting the connection of the university with the society through the implementation of advisory counseling, training and development of teaching and administrative staff. 5. The service of preparing graduates specialized in physics who contribute to development in the country. 6. Meeting the needs of various sectors with highly qualified personals in the field of physics. 7. Encouraging the distinguished in this field to work as teaching assistants in the department to be part of the academic teaching staff in the future.

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

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	**6 hours**	introduction	Introduction to a modern physics laboratory	Theoretical	General questions +Exam
2	**6 hours**	Graph	Teach students how to graph	Theoretical	General questions +Exam
3	**6 hours**	Graph	Graph test	Theoretical	General questions +Exam
4	**6 hours**	Experiment (1)	The back scattering For Beta particles	Theoretical	General questions +Exam
5	**6 hours**	Experiment (2)	Photoelectric Effect	Theoretical	General questions +Exam
6	**6 hours**	Experiment (3)	Calculating the electron to mass ratio (e/m) (Thomsen method)	Theoretical	General questions +Exam
7	**6 hours**	Experiment (4)	Millikan's Oil Drop	Theoretical	Exam
8	**6 hours**	Experiment (5)	Determination of Rydberg Constant	Theoretical	General questions +Exam
9	**6 hours**	Experiment (6)	Light Absorption coefficient by using photo cell	Theoretical	General questions +Exam
10	**6 hours**	Experiment (7)	Determination of the first excitation potential for Helium	Theoretical	General questions +Exam
11	**6 hours**	Experiment (8)	The Characteristics of Geiger's Counter	Theoretical	General questions +Exam
12	**6 hours**	Explanation of experiments for students who are absent with an official excuse	All the experiments	Theoretical	General questions +Exam
13	**6 hours**	Review of experiments before taking the final exam	All the experiments	Theoretical	General questions +Exam
14	**6 hours**	Exam of the all experiments	Semester exam	Theoretical	General questions +Exam

15	**6 hours**	Exam of the all experiments	Final exam	Theoretical	General questions +Exam
16	**6 hours**	introduction		Theoretical	

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)	Talab nahi al- khafaja" practical physics for the second stage " 1978
Main references (sources)	Talab nahi al- khafaja" atomic physics ", 1980
Recommended books and references (scientific journals, reports…)	sheet lab. Experiments
Electronic References, Websites	Videos showing the Experimental via the internet

Course Description Form

1. Course Name:
Atomic Physics II
2. Course Code:
PHY 2420
3. Semester / Year:
Second semester / Second Stage
4. Description Preparation Date:
2024-4-2
5. Available Attendance Forms:
Weekly
6. Number of Credit Hours (Total) / Number of Units (Total)
30 hours
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Mohammed Abdullah Hameed Email: mohammed.a@sc.uobaghdad.edu.iq
8. Course Objectives

Course Objectives	Teaching students the basic principles of physics. 2. Preparing specialists in the field of general physics and its practical applications, which bears the responsibility of studying the country's need for development and progress and capable of meeting the needs of the job market in state institutions and industry sectors. 3. Preparing an educated generation armed with science and adopts it as a sound basis to bring about radical changes and assign scientific knowledge and scientific methods in thinking, analysis and adaptation with the development of technologies, to keep up with the expansion of human needs. 4. Effective contribution for deepening and documenting the connection of the university with the society through the implementation of advisory counseling, training and development of teaching and administrative staff. 5. The service of preparing graduates specialized in physics who contribute to development in the country. 6. Meeting the needs of various sectors with highly qualified personals in the field of physics. 7. Encouraging the distinguished in this field to work as teaching assistants in the department to be part of the academic teaching staff in the future.

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

10. Course Structure					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
1	**2 hours**	Chapter1	**The atomic models of Rutherford and Bohr** **1.1 Introduction** **1.2 The Rutherford model of the atom**	Theoretical	General questions +Exam
2	**2 hours**	Chapter2	**1.3 Spectrum of hydrogen gas1.3 Spectrum of hydrogen gas** **1.4 Boher model of theory of atoms**	Theoretical	General questions +Exam
3	**2 hours**	Chapter3	**1.5 Energy levels of hydrogen atom** **1.6 Binding energy**	Theoretical	General questions +Exam
4	**2 hours**	Chapter4	**1.7 Ionization potentials of hydrogen atom** **Many electron atoms**	Theoretical	General questions +Exam
5	**2 hours**	Chapter5	**1.8 Quantum numbers** **1.10 Pauli exclusion principle**	Theoretical	General questions +Exam
6	**2 hours**	Chapter6	**Electron shells and chemical activity and Examples**	Theoretical	General questions +Exam
7	**2 hours**		**Exam**	Theoretical	Exam
8	**2 hours**	Chapter7	**X-rays** **3.1 Discovery** **3.2 Production of x-rays**	Theoretical	General questions +Exam
9	**2 hours**	Chapter8	**3.3 The nature of x-rays** **3.4 X-rays diffraction**	Theoretical	General questions +Exam
10	**2 hours**	Chapter9	**3.5 Mechanism of x-ray production** **3.6 X-ray energy**	Theoretical	General questions +Exam
11	**2 hours**	Chapter10	**3.7 X-ray spectra of the elementsatomic number** **3.8 Compton scattering**	Theoretical	General questions +Exam
12	**2 hours**	Chapter11	**Structure of solids** **2.1 Introduction** **2.2 Atomic bonding** **- Ionic bonding** **- Covalent bonding**	Theoretical	General questions +Exam
13	**2 hours**	Chapter12	**- Metallic bonding** **- Vander wall's bonding**	Theoretical	General questions +Exam

14	**2 hours**	Chapter1	**2.3 Unit cell** **2.4 Miller indices**	Theoretical	General questions +Exam
15	**2 hours**	Chapter13	**2.5 Crystal structure** **- Lattice planes and direction** **- Atomic packing**	Theoretical	General questions +Exam
16	**2 hours**	Chapter14	**The atomic models of Rutherford and Bohr** **1.2 Introduction** **1.2 The Rutherford model of the atom**	Theoretical	

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)	**M. Russell Wehr and James A. Richards** **"The physics of the atom"** **2- Richard T. Wridner and Robert L. Sells** **"Elementry modern physics"** **3- M.C. Lovell and A. J. Avery** **"Physcal properties of material"**
Main references (sources)	**Modern Physics Books**
Recommended books and references (scientific journals, reports…)	**none**
Electronic References, Websites	**Modern Physics Websites**

Course Description Form

13. Course Name:	
Heat and Thermodynamic	
14. Course Code:	
PHY 2421	
15. Semester / Year:	
Second semester / Second Stage	
16. Description Preparation Date:	
2024-4-2	
17.Available Attendance Forms:	
Weekly	
18.Number of Credit Hours (Total) / Number of Units (Total)	
30 hours	
19. Course administrator's name (mention all, if more than one name)	
Name: Dr.Hussein Khazal Rasheed Email: Hussein.k@sc.uobaghdad .edi.iq	
20. Course Objectives	
Course Objectives	Teaching students the basic principles of physics. 2. Preparing specialists in the field of general physics and its practical applications, which bears the responsibility of studying the country's need for development and progress and capable of meeting the needs of the job market in state institutions and industry sectors. 3. Preparing an educated generation armed with science and adopts it as a sound basis to bring about radical changes and assign scientific knowledge and scientific methods in thinking, analysis and adaptation with the development of technologies, to keep up with the expansion of human needs. 4. Effective contribution for deepening and documenting the connection of the university with the society through the implementation of advisory counseling, training and development of teaching and administrative staff. 5. The service of preparing graduates specialized in physics who contribute to development in the country. 6. Meeting the needs of various sectors with highly qualified personals in the field of physics. 7. Encouraging the distinguished in this field to work as teaching assistants in the department to be part of the academic teaching staff in the future.
21. Teaching and Learning Strategies	
Strategy	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students
22. Course Structure	

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	**2 hours**	Chapter1	Heat Engines and the Second Law of Thermodynamics	Theoretical	General questions +Exam
2	**2 hours**	Chapter2	Reversible and Irreversible Processes The Carnot Engine	Theoretical	General questions +Exam
3	**2 hours**	Chapter3	Gasoline and Diesel Engines Heat Pumps and Refrigerators Entropy	Theoretical	General questions +Exam
4	**2 hours**	Chapter4	Entropy Changes in Irreversible Processes	Theoretical	General questions +Exam
5	**2 hours**	Chapter5	Total Differential of a Dependent Variable Total Differential of the Internal Energy Enthalpy, Helmholtz Energy, and Gibbs Energy	Theoretical	General questions +Exam
6	**2 hours**	Chapter6	Closed Systems. Open Systems Maxwell Equations	Theoretical	General questions +Exam
7	**2 hours**		**Exam**	Theoretical	Exam
8	**2 hours**	Chapter7	Expressions for Heat Capacity Surface Work Criteria for Spontaneity	Theoretical	General questions +Exam
9	**2 hours**	Chapter8	The Clayperon equation	Theoretical	General questions +Exam
10	**2 hours**	Chapter9	General Relation of du,	Theoretical	General questions +Exam
11	**2 hours**	Chapter10	General Relation of dh	Theoretical	General questions +Exam
12	**2 hours**	Chapter11	General Relation of ds	Theoretical	General questions +Exam

13	**2 hours**	Chapter12	TdS equations	Theoretical	General questions +Exam
14	**2 hours**	Chapter1	General relation of C_P, C_V Mayer relation	Theoretical	General questions +Exam
15	**2 hours**	Chapter13	The Joule–Thomson coefficient	Theoretical	General questions +Exam
16	**2 hours**	Chapter14	**Final Exam**	Theoretical	

23. Course Evaluation

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

24. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Mark Waldo Zemansky_ Richard Dittman - Heat and thermodynamics _ an intermediate textbook (1997, McGraw-Hill Thermodynamics and engineering approach, fifth edition, Younis A.Cengel and Mechael A. Boles Thermodynamics and chemistry , Second Edition Version 4, March 2012, Haward Devone
Main references (sources)	None
Recommended books and references (scientific journals, reports…)	none
Electronic References, Websites	none

Course Description Form

1. Course Name:
Analytical Mechanics (2)
2. Course Code:
PHY 2422
3. Semester / Year:
Second semester / Second Stage
4. Description Preparation Date:
2024-4-2
5. Available Attendance Forms:
Weekly
6. Number of Credit Hours (Total) / Number of Units (Total)
30 hours
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Raad Mohammed Email: raad.m@sc.uobaghdad.edu.iq
8. Course Objectives

Course Objectives	Teaching students the basic principles of physics. 2. Preparing specialists in the field of general physics and its practical applications, which bears the responsibility of studying the country's need for development and progress and capable of meeting the needs of the job market in state institutions and industry sectors. 3. Preparing an educated generation armed with science and adopts it as a sound basis to bring about radical changes and assign scientific knowledge and scientific methods in thinking, analysis and adaptation with the development of technologies, to keep up with the expansion of human needs. 4. Effective contribution for deepening and documenting the connection of the university with the society through the implementation of advisory counseling, training and development of teaching and administrative staff. 5. The service of preparing graduates specialized in physics who contribute to development in the country. 6. Meeting the needs of various sectors with highly qualified personals in the field of physics. 7. Encouraging the distinguished in this field to work as teaching assistants in the department to be part of the academic teaching staff in the future.

9. Teaching and Learning Strategies

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

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	**2 hours**	Chapter1	Dynamics of Systems of Particles, Center of Mass and Linear Momentum of a System, Angular Momentum and Kinetic Energy of a System.	Theoretical	General questions +Exam
2	**2 hours**	Chapter2	Motion of Two Interacting Bodies: The Reduced Mass, The Restricted Three-Body Problem, Collisions, Oblique Collisions and Scattering: Comparison of Laboratory and Center of Mass Coordinates.	Theoretical	General questions +Exam
3	**2 hours**	Chapter3	Motion of a Body with Variable Mass: Rocket Motion, Center of Mass of a Rigid Body, Rotation of a Rigid Body about a Fixed Axis: Moment of Inertia.	Theoretical	General questions +Exam
4	**2 hours**	Chapter4	Calculation of the Moment of Inertia, The Physical Pendulum, The Angular Momentum of a Rigid Body in Laminar Motion, Examples of the Laminar Motion of a Rigid Body.	Theoretical	General questions +Exam
5	**2 hours**	Chapter5	Impulse and Collisions Involving Rigid Bodies, Motion of Rigid Bodies in 3D, Rotation of a Rigid Body about an Arbitrary Axis: Moments and Products of Inertia—Angular Momentum and Kinetic Energy.	Theoretical	General questions +Exam
6	**2 hours**	Chapter6	Principal Axes of a Rigid Body, Euler's Equations of Motion of a Rigid Body, Free Rotation of a Rigid Body: Geometric Description of the Motion.	Theoretical	General questions +Exam
7	**2 hours**		**Exam**	Theoretical	Exam
8	**2 hours**	Chapter7		Theoretical	General questions +Exam
9	**2 hours**	Chapter8	The Energy Equation and Nutation, The Gyrocompass, Why Lance Doesn't Fall Over (Mostly), Lagrangian	Theoretical	General questions +Exam

			Mechanics, Hamilton's Variational Principle: An Example.		
10	**2 hours**	Chapter9	Generalized Coordinates, Calculating Kinetic and Potential Energies in Terms of Generalized Coordinates: An Example.	Theoretical	General questions +Exam
11	**2 hours**	Chapter10	Lagrange's Equations of Motion for Conservative Systems, Some Applications of Lagrange's Equations, Generalized Momenta: Ignorable Coordinates.	Theoretical	General questions +Exam
12	**2 hours**	Chapter11	Forces of Constraint: Lagrange Multipliers, D'Alembert's Principle: Generalized Forces, The Hamiltonian Function: Hamiltoti's Equations.	Theoretical	General questions +Exam
13	**2 hours**	Chapter12	Potential Energy and Equilibrium: Stability, Oscillation of a System with One Degree of Freedom about a Position of Stable Equilibrium.	Theoretical	General questions +Exam
14	**2 hours**	Chapter1	Coupled Harmonic Oscillators: Normal Coordinates, General Theory of Vibrating Systems.	Theoretical	General questions +Exam
15	**2 hours**	Chapter13	Vibration of a Loaded String or Linear Array of Coupled Harmonic Oscillators, Vibration of a Continuous System: The Wave Equation.	Theoretical	General questions +Exam
16	**2 hours**	Chapter14	**Final Exam**	Theoretical	

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)	Analytical mechanics (Fowlus Cassiday).
Main references (sources)	none
Recommended books and references (scientific journals, reports…)	none
Electronic References, Websites	none

Course Description Form

1. Course Name:
Analogue Electronics
2. Course Code:
PHY 2423
3. Semester / Year:
Second semester / Second Stage
4. Description Preparation Date:
2024-4-2
5. Available Attendance Forms:
Weekly
6. Number of Credit Hours (Total) / Number of Units (Total)
30 hours
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Estabraq Talib Abdullah Email: Estabraqtalib@sc.uobaghdad.edu.iq
8. Course Objectives

Course Objectives	Teaching students the basic principles of physics. 2. Preparing specialists in the field of general physics and its practical applications, which bears the responsibility of studying the country's need for development and progress and capable of meeting the needs of the job market in state institutions and industry sectors. 3. Preparing an educated generation armed with science and adopts it as a sound basis to bring about radical changes and assign scientific knowledge and scientific methods in thinking, analysis and adaptation with the development of technologies, to keep up with the expansion of human needs. 4. Effective contribution for deepening and documenting the connection of the university with the society through the implementation of advisory counseling, training and development of teaching and administrative staff. 5. The service of preparing graduates specialized in physics who contribute to development in the country. 6. Meeting the needs of various sectors with highly qualified personals in the field of physics. 7. Encouraging the distinguished in this field to work as teaching assistants in the department to be part of the academic teaching staff in the future.

9. Teaching and Learning Strategies

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

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2 hours	Chapter1	Introduction to Digital Electronics	Theoretical	General questions +Exam
2	2 hours	Chapter2	Logic gates	Theoretical	General questions +Exam
3	2 hours	Chapter3	Combinational logic Circuits	Theoretical	General questions +Exam
4	2 hours	Chapter4	Applications	Theoretical	General questions +Exam
5	2 hours	Chapter5	Boolean algebra	Theoretical	General questions +Exam
6	2 hours	Chapter6	Simplicity logic equations using Boolean algebra	Theoretical	General questions +Exam
7	2 hours		**Exam**	Theoretical	Exam
8	2 hours	Chapter7	Arithmetic Logic Circuits: Addition (Half adder, full adder, binary adder)	Theoretical	General questions +Exam
9	2 hours	Chapter8	Subtraction (half subtractor, full subtractor, binary subtractor)	Theoretical	General questions +Exam
10	2 hours	Chapter9	RS flip-flop and D flip-flop	Theoretical	General questions +Exam
11	2 hours	Chapter10	JK flip-flop and T flip-flop	Theoretical	General questions +Exam
12	2 hours	Chapter11	Master-Slave flip-flop and Preset and Clear	Theoretical	General questions +Exam
13	2 hours	Chapter12	Simplifying Logic Equations using Karnaugh Maps	Theoretical	General questions +Exam
14	2 hours	Chapter1	AND-OR network and OR-AND network	Theoretical	General questions +Exam
15	2 hours	Chapter13	NAND-NAND network and NOR-NOR network	Theoretical	General questions +Exam
16	2 hours		**Final exam**	Theoretical	

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)	Digital Fundamental by Thomas L. Floyd
Main references (sources)	Theory And Problem Of Digital Principles by Roger L. Tokheim
Recommended books and references (scientific journals, reports…)	none
Electronic References, Websites	none

Course Description Form

1. Course Name:
Computer Skill (2)
2. Course Code:
UOB 207
3. Semester / Year:
Second semester / Second Stage
4. Description Preparation Date:
2024-4-2
5. Available Attendance Forms:
Weekly
6. Number of Credit Hours (Total) / Number of Units (Total)
30 hours
7. Course administrator's name (mention all, if more than one name)
Name: Mela Ghazi Abdul-Haleem Email: a.mela@sc.uobaghdad.edu.iq
8. Course Objectives

Course Objectives	This module provides an introduction to essential computer skills. In this module, students will learn, • computer literacy, including hardware and software fundamentals in theory as well as practical. • various office applications (Microsoft Word, Excel, and PowerPoint), where students will use these software applications to create a current resume, and slide presentation. • basic computer knowledge and skills required to obtain an understanding of computer hardware, software, Internet, and web search.

9. Teaching and Learning Strategies	
Strategy	By the end of this module, students should be able to: 1. Understand computer hardware, software components, and peripheral devices, enabling them to use computers confidently. 2. Manage and organize files and folders on a computer effectively, including creating, renaming, moving, and deleting files and folders. 3. Efficiently employ Microsoft Office to execute fundamental tasks with ease. 4. Navigate the internet and communicate via email, while understanding internet safety.

	Upon finishing the course, students will be aware of the ethical and security considerat when using computers, promoting safe and responsible digital behavior.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	**2 hours**	Chapter1	Computer Fundamentals. Characteristics of Computers, Block Diagram of Computer: Input Unit, Storage Unit, Memory size, Output Unit, Arithmetic Logical Unit, Control Unit, Central Processing Unit, Data Representation: Binary Number System.	Theoretical	1
2	**2 hours**	Chapter2	Memory: Types, Units of memory, RAM, ROM, Secondary storage devices – HDD, Flash Drives, Optical Disks: DVD I/O Devices – Keyboard, Mouse, LCDs, Scanner, Plotter, Printer and Latest I/O devices in market	Theoretical	2
3	**2 hours**	Chapter3	MS Windows: Desktop, My Computer, Files and folders using windows explorer; Control Panel, Searching Files and folders	Theoretical	3
4	**2 hours**	Chapter4	MS Word: Introduction, Environment, Help, Creating and Editing Word Document. Saving Document, Working with Text: Selecting, Formatting, Aligning and Indenting	Theoretical	4
5	**2 hours**	Chapter5	MS Word: Finding Replacing Text, Bullets and Numbering, Header and Footer, Working with Tables, Properties Using spell checker, Grammar, AutoCorrect Feature, Synonyms and Thesaurus	Theoretical	5
6	**2 hours**	Chapter6	MS Word: Graphics: Inserting Pictures, Clipart, Drawing Objects, Using Word Art. Setting page size and margins; Printing documents. Mail Merge Practical	Theoretical	6
7	**2 hours**		**Exam**	Theoretical	7

8	**2 hours**	Chapter7	MS-Excel: Environment, Creating, Opening, and Saving Workbook. Range of Cells. Formatting Cells, Functions: Mathematical, Logical, Date, Time, Auto Sum	Theoretical	8
9	**2 hours**	Chapter8	MS-Excel: Formulas. Graphs: Charts. Types and Chart Tool Bar. Printing: Page Layout, Header and Footer Tab	Theoretical	9
10	**2 hours**	Chapter9	MS PowerPoint: Environment, Creating and Editing presentation, Auto content wizard, using built-in templates	Theoretical	10
11	**2 hours**	Chapter10	MS PowerPoint: Types of Views: Normal, Outline, Slide, Slide Sorter, Slide Show, Creating customized templates; formatting presentations Graphics: AutoShapes, adding multimedia contents, printing slides	Theoretical	11
12	**2 hours**	Chapter11	Internet: Basic Internet terms: Web Page, Website, Home page, Browser, URL, Hypertext, ISP,	Theoretical	12
13	**2 hours**	Chapter12	Web Server Applications: WWW, e-mail, Instant Messaging, Internet Telephony, Videoconferencing, Web Browser and its environment	Theoretical	13
14	**2 hours**		Computer Ethics and Societal Impact: Computer ethics encompass a collection of moral principles that regulate the utilization of computers. It reflects society's perspectives regarding the use of computer hardware and software. These ethical considerations address a range of critical issues, including privacy concerns, intellectual property rights, and the broader societal impact of computer technology.	Theoretical	14
15	**2 hours**		**Preparatory week**	Theoretical	
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)	No
Main references (sources)	No
Recommended books and references (scientific journals, reports…)	Wikipedia
Electronic References, Websites	Wikipedia

Course Description Form

1. Course Name:
Mathematic IIII
2. Course Code:
PMa 208
3. Semester / Year:
Second semester / Second Stage
4. Description Preparation Date:
2024-4-2
5. Available Attendance Forms:
Weekly
6. Number of Credit Hours (Total) / Number of Units (Total)
30 hours
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Muthana Hameed Khalaf Email: muthana.khalaf@sc.uobaghdad.edu.iq
8. Course Objectives

Course Objectives	Teaching students the basic principles of physics. 2. Preparing specialists in the field of general physics and its practical applications, which bears the responsibility of studying the country's need for development and progress and capable of meeting the needs of the job market in state institutions and industry sectors. 3. Preparing an educated generation armed with science and adopts it as a sound basis to bring about radical changes and assign scientific knowledge and scientific methods in thinking, analysis and adaptation with the development of technologies, to keep up with the expansion of human needs. 4. Effective contribution for deepening and documenting the connection of the university with the society through the implementation of advisory counseling, training and development of teaching and administrative staff. 5. The service of preparing graduates specialized in physics who contribute to development in the country. 6. Meeting the needs of various sectors with highly qualified personals in the field of physics. 7. Encouraging the distinguished in this field to work as teaching assistants in the department to be part of the academic teaching staff in the future.

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

10. Course Structure

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

1	**2 hours**	Vector and the geometry of space	Vector	Theoretical	General questions +Exam
2	**2 hours**	Length of vector , Equation of sphere, u	Vector	Theoretical	General questions +Exam
3	**2 hours**	Dot product	Vector	Theoretical	General questions +Exam
4	**2 hours**	Cross product	Vector	Theoretical	General questions +Exam
5	**2 hours**	equation of line and plane (part1)	equation of line and plane	Theoretical	General questions +Exam
6	**2 hours**	equation of line and plane (part2)	equation of line and plane	Theoretical	General questions +Exam
7	**2 hours**	Chain Rule of partial derivative (part 1)	Chain Rule of partial derivative	Theoretical	Exam
8	**2 hours**	**exam**			
9	**2 hours**	Chain Rule of partial derivative (part 2)	Chain Rule of partial derivative	Theoretical	General questions +Exam
10	**2 hours**	Gradient	Application of finite Integration	Theoretical	General questions +Exam
11	**2 hours**	Direction derivative (part 1)	Direction derivative	Theoretical	General questions +Exam
12	**2 hours**	Direction derivative (part 2)	Direction derivative	Theoretical	General questions +Exam
13	**2 hours**	Extrema value and saddle point (part 1)	Extrema value and saddle point	Theoretical	General questions +Exam
14	**2 hours**	Extrema value and saddle point (part 2)	Extrema value and saddle point	Theoretical	General questions +Exam
15	**2 hours**	example	example	Theoretical	General questions +Exam

16	**2 hours**	**Final exam**	Theoretical	

11. Course Evaluation

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

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	1 .Stewart. J. "Calculas", 7th Edition, 2012. 2 .Thomas. G. B. & Finney. R. L., "Calculas and Analytic Geometry", 6th Edition, 1984.
Main references (sources)	
Recommended books and references (scientific journals, reports…)	none
Electronic References, Websites	none

Course Description Form

1. Course Name:
Analogue Electronics / Lab.
2. Course Code:
PHY 2316
3. Semester / Year:
Second semester / Second Stage
4. Description Preparation Date:
2024-4-2
5. Available Attendance Forms:
Weekly
6. Number of Credit Hours (Total) / Number of Units (Total)
30 hours
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Estabraq Talib Abdullah Email: Estabraqtalib@sc.uobaghdad.edu.iq
8. Course Objectives

Course Objectives	Teaching students the basic principles of physics. 2. Preparing specialists in the field of general physics and its practical applications, which bears the responsibility of studying the country's need for development and progress and capable of meeting the needs of the job market in state institutions and industry sectors. 3. Preparing an educated generation armed with science and adopts it as a sound basis to bring about radical changes and assign scientific knowledge and scientific methods in thinking, analysis and adaptation with the development of technologies, to keep up with the expansion of human needs. 4. Effective contribution for deepening and documenting the connection of the university with the society through the implementation of advisory counseling, training and development of teaching and administrative staff. 5. The service of preparing graduates specialized in physics who contribute to development in the country. 6. Meeting the needs of various sectors with highly qualified personals in the field of physics. 7. Encouraging the distinguished in this field to work as teaching assistants in the department to be part of the academic teaching staff in the future.

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

10. Course Structure

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

1	**6 hours**	**none**	Introduction of Analog Equipment's	Practical	General questions
2	**6 hours**	**none**	Introduction of Analog Electronic Components	Practical	Solve on the board
3	**6 hours**	**none**	STUDY OF THE CHARACTERISTICS OF A DIODE AND THE CHARECTERISTIC OF ZENER DIODE (Part 1)	Practical	Graph paper exam
4	**6 hours**	**none**	STUDY OF THE CHARACTERISTICS OF A DIODE AND THE CHARECTERISTIC OF ZENER DIODE (Part 2)	Practical	Daily exam and assessment report
5	**6 hours**	**none**	Power Supply - Half Rectifier	Practical	Daily exam and assessment report
6	**6 hours**	**none**	Power Supply - Full Rectifier	Practical	Daily exam and assessment report
7	**6 hours**	**none**	**Exam**	Practical	Daily exam and assessment report
8	**6 hours**	**none**	TRANSISTOR COMMON EMITTER CHARACTERISTICS	Practical	Daily exam and assessment report
9	**6 hours**	**none**	TRANSISTOR COMMON EMITTER CHARACTERISTICS (Part 1)	Practical	Daily exam and assessment report
10	**6 hours**	**none**	TRANSISTOR COMMON EMITTER CHARACTERISTICS (Part 2)	Practical	Daily exam and assessment report
11	**6 hours**	**none**	TRANSISTOR COMMON EMITTER CHARACTERISTICS (Output Circuit) (Part 1)	Practical	Daily exam and assessment report
12	**6 hours**	**none**	TRANSISTOR COMMON EMITTER CHARACTERISTICS (Output Circuit) (Part 2)	Practical	Daily exam and assessment report
13	**6 hours**	**none**	TRANSISTOR COMMON EMITTER CHARACTERISTICS (Input Circuit)	Practical	Daily exam

14	**6 hours**	**none**	DESIGN OF A COMMON EMITTER AMPLIFIER (Part 1)	Practical	Exam
15	**6 hours**	**none**	DESIGN OF A COMMON EMITTER AMPLIFIER (Part 2)	Practical	Exam
16	**6 hours**	**none**	**Final Exam**	Practical	

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)	Electronic devices by Thomas L. Floyed
Main references (sources)	Electronic and instrumentation by Gupta
Recommended books and references (scientific journals, reports…)	none
Electronic References, Websites	none

Course Description Form

1. Course Name:
Heat and Thermodynamic/ lab.
2. Course Code:
PHY 2421
3. Semester / Year:
Second semester / Second Stage
4. Description Preparation Date:
2024-4-2
5. Available Attendance Forms:
Weekly
6. Number of Credit Hours (Total) / Number of Units (Total)
30 hours
7. Course administrator's name (mention all, if more than one name)
Name: Dr.Hussein Khazal Rasheed Email: Hussein.k@sc.uobaghdad .edi.iq
8. Course Objectives

Course Objectives	Teaching students the basic principles of physics. 2. Preparing specialists in the field of general physics and its practical applications, which bears the responsibility of studying the country's need for development and progress and capable of meeting the needs of the job market in state institutions and industry sectors. 3. Preparing an educated generation armed with science and adopts it as a sound basis to bring about radical changes and assign scientific knowledge and scientific methods in thinking, analysis and adaptation with the development of technologies, to keep up with the expansion of human needs. 4. Effective contribution for deepening and documenting the connection of the university with the society through the implementation of advisory counseling, training and development of teaching and administrative staff. 5. The service of preparing graduates specialized in physics who contribute to development in the country. 6. Meeting the needs of various sectors with highly qualified personals in the field of physics. 7. Encouraging the distinguished in this field to work as teaching assistants in the department to be part of the academic teaching staff in the future.

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

10. Course Structure

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

1	**6 hours**	**none**	Introduction to the laboratory experiments	Practical	Practical
2	**6 hours**	**none**	Measuring the heat of vaporization of a liquid by electrical method	Practical	Practical
3	**6 hours**	**none**	Measurement of saturated vapor pressure of a rapidly evaporating liquid such as alcohol	Practical	Practical
4	**6 hours**	**none**	Calculate the ratio of the thermal conductivity coefficients of two inferior materials	Practical	Practical
5	**6 hours**	**none**	joule equivalent	Practical	Practical
6	**6 hours**	**none**	Thermal conductivity coefficient of glass	Practical	Practical
7	**6 hours**	**none**	**Exam**	Practical	Practical
8	**6 hours**	**none**	The specific heat of a poorly conductive body by mixing method	Practical	Practical
9	**6 hours**	**none**	The change of viscosity coefficient of a liquid with temperature	Practical	Practical
10	**6 hours**	**none**	Measuring energy in terms of voltage and current and comparing it with the energy of water	Practical	Practical
11	**6 hours**	**none**	Converting mechanical energy to thermal energy	Practical	Practical
12	**6 hours**	**none**	Finding the efficiency of solar collector	Practical	Practical
13	**6 hours**	**none**	Study the characteristics of heat pump	Practical	Practical
14	**6 hours**	**none**	Measuring the volume expansion coefficient of liquids	Practical	Practical

15	**6 hours**	**none**	Review the experiments	Practical	Practical
16	**6 hours**	**none**	**Final Exam**	Practical	Practical

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)	Mark Waldo Zemansky_ Richard Dittman - Heat and thermodynamics _ an intermediate textbook (1997, McGraw-Hill Thermodynamics and engineering approach, fifth edition, Younis A.Cengel and Mechael A. Boles Thermodynamics and chemistry , Second Edition Version 4, March 2012, Haward Devone
Main references (sources)	none
Recommended books and references (scientific journals, reports…)	none
Electronic References, Websites	none

Course Description Form

1. Course Name:
Practical physics I(modern physics I I) / Lab
2. Course Code:
PHY 2420
3. Semester / Year:
Second semester / Second Stage
4. Description Preparation Date:
2024-4-2
5. Available Attendance Forms:
Weekly
6. Number of Credit Hours (Total) / Number of Units (Total)
30 hours
7. Course administrator's name (mention all, if more than one name)
Name: Samar Imran Essa Email: samar.o@sc.uobaghdad.edu.iq
8. Course Objectives

Course Objectives	Teaching students the basic principles of physics. 2. Preparing specialists in the field of general physics and its practical applications, which bears the responsibility of studying the country's need for development and progress and capable of meeting the needs of the job market in state institutions and industry sectors. 3. Preparing an educated generation armed with science and adopts it as a sound basis to bring about radical changes and assign scientific knowledge and scientific methods in thinking, analysis and adaptation with the development of technologies, to keep up with the expansion of human needs. 4. Effective contribution for deepening and documenting the connection of the university with the society through the implementation of advisory counseling, training and development of teaching and administrative staff. 5. The service of preparing graduates specialized in physics who contribute to development in the country. 6. Meeting the needs of various sectors with highly qualified personals in the field of physics. 7. Encouraging the distinguished in this field to work as teaching assistants in the department to be part of the academic teaching staff in the future.

9. Teaching and Learning Strategies

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

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	6 hours	introduction	Find the Rydberg constant	Find the Rydberg constant	Find the Rydberg constant
2	6 hours	Graph	Backscattering of a beta particle	Backscattering of a beta particle	Backscattering of a beta particle
3	6 hours	Graph	Measure the ionization potential using Frank-Hertz tube	Measure the ionization potential using Frank-Hertz tube	Measure the ionization potential using Frank-Hertz tube
4	6 hours	Experiment (1)	Spectrum of helium atom	Spectrum of helium atom	Spectrum of helium atom
5	6 hours	Experiment (2)	Inverse square law	Inverse square law	Inverse square law
6	6 hours	Experiment (3)	Planck's constant	Planck's constant	Planck's constant
7	6 hours		Midterm Exam	Midterm Exam	Midterm Exam
8	6 hours	Experiment (4)	Stefan's law	Stefan's law	Stefan's law
9	6 hours	Experiment (5)	Find the stopping potential	Find the stopping potential	Find the stopping potential
10	6 hours	Experiment (6)	Light absorption coefficient using half thickness	Light absorption coefficient using half thickness	Light absorption coefficient using half thickness
11	6 hours	Experiment (7)	Determination of the charge of an electron by Millikan experiment	Determination of the charge of an electron by Millikan experiment	Determination of the charge of an electron by Millikan experiment
12	6 hours	Explanation of experiments for students who are absent with an official excuse	Determining the wavelengths Hα , Hβ , and Hγ from Balmer series of Hydrogen atom	Determining the wavelengths Hα , Hβ , and Hγ from Balmer series of Hydrogen atom	Determining the wavelengths Hα , Hβ , and Hγ from Balmer series of Hydrogen atom
13	6 hours	Review of experiments before taking the final exam	Black body radiation	Black body radiation	Black body radiation

14	**6 hours**	Exam of the all experiments	**Diffraction of electrons in a polycrystalline lattice (Debye-Scherrer diffraction)**	**Diffraction of electrons in a polycrystalline lattice (Debye-Scherrer diffraction)**	**Diffraction of electrons in a polycrystalline lattice (Debye-Scherrer diffraction)**
15	**6 hours**	Exam of the all experiments	**Rutherford dispersed**	**Rutherford dispersed**	**Rutherford dispersed**
16	**6 hours**		**Final exam**	Theoretical	

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)	Talab nahi al- khafaja" practical physics for the sec stage " 1978
Main references (sources)	Talab nahi al- khafaja" atomic physics ", 1980
Recommended books and references (scientific journals, reports…)	sheet lab. Experiments
Electronic References, Websites	Videos showing the Experimental via the internet

Course Description Form

1. Course Name:
Molecular Physics
2. Course Code:
PHY 3525
3. Semester / Year:
First semester/ Third Stage
4. Description Preparation Date:
2024-4-2
5. Available Attendance Forms:
Weekly
6. Number of Credit Hours (Total) / Number of Units (Total)
30 hours
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Firas Jawad Kadhim Dr. Zainb Sabeh Sadik Email: Firas.Kadhim@sc.uobaghdad.edu.iq
8. Course Objectives

Course Objectives	Teaching students the basic principles of physics. 2. Preparing specialists in the field of general physics and its practical applications, which bears the responsibility of studying the country's need for development and progress and capable of meeting the needs of the job market in state institutions and industry sectors. 3. Preparing an educated generation armed with science and adopts it as a sound basis to bring about radical changes and assign scientific knowledge and scientific methods in thinking, analysis and adaptation with the development of technologies, to keep up with the expansion of human needs. 4. Effective contribution for deepening and documenting the connection of the university with the society through the implementation of advisory counseling, training and development of teaching and administrative staff. 5. The service of preparing graduates specialized in physics who contribute to development in the country. 6. Meeting the needs of various sectors with highly qualified personals in the field of physics. 7. Encouraging the distinguished in this field to work as teaching assistants in the department to be part of the academic teaching staff in the future.

9. Teaching and Learning Strategies	
Strategy	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes,

	interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	**2 hours**	Introduction to atomic physics	Dalton's atom, Electron, Thomson's atom, Proton, Neutron, Penetration of alpha particle through thin gold foil	Theoretical	General questions +Exam
2	**2 hours**	, Electromagnetic Radiation,	Rutherford's atom, Failure of Thomson's atom, Failure of Rutherford's atom, Bohr's atom, Photon energy, What is Bohr's idea account for?	Theoretical	General questions +Exam
3	**2 hours**	Electromagnetic Spectrum	Nuclear radii, Nuclear density, Nuclear size,	Theoretical	General questions +Exam
4	**2 hours**	Chemical Bond, Types of Chemical Bonds	Nomenclature (Nuclide, Isotopes, Isobars, Isomer, Nucleon, Mesons), Mass defect, Binding energy,	Theoretical	General questions +Exam
5	**2 hours**	,(Ionic Bond, Covalent Bonds, Hydrogen Bonds, van der Waals	Nuclear forces, Properties of nuclear forces, Nuclear separation energy, Chart of Nuclides and nuclear stability, Nuclear abundance	Theoretical	General questions +Exam
6	**2 hours**	Electronegativity, Bond Polarity and Electronegativity, Polarity of Molecules	Nuclear angular momentum, Nuclear Parity, Magnetic dipole moments,	Theoretical	General questions +Exam
7	**2 hours**	Electron affinity, Bond Dipole Moments, Molecular Dipole Moments	Electric quadrupole moments, Wave mechanical properties, Types of statistics: (Bose-Einstein statistics and Fermi – Dirac statistics)	Theoretical	Exam
8	**2 hours**	Molecular orbital theory; magnetism of molecules, HOMO & LOMO	Monthly Exam in Chapters 1, 2 and 3	Theoretical	General questions +Exam
9	**2 hours**	Molecular spectroscopy-Boron-Openheimer approximation-molecular energy level diagram	Schrodinger wave equation, Bound states in one dimensional systems, Particle in square well	Theoretical	General questions +Exam
10	**2 hours**	Rotational Spectroscopy of diatomic molecules-classical description and quantum description-	Bound states in three dimensions, Neutron-Proton system: Bound state	Theoretical	General questions +Exam

		rigid rotor model-non-rigid rotor- selection rules of rotational transitions	of the deuteron, overview of cross section calculation.		
11	**2 hours**	vibrational Spectroscopy of diatomic molecules-classical and quantum descriptions- harmonic oscillator model-unharmonicity- selection rules of vibrational transitions- vibration of polyatomic molecules (degree of freedom)	Charged particle interaction: (Maximum Energy Transfer in a Single Collision, Stopping Power, Range of a particle)	Theoretical	General questions +Exam
12	**2 hours**	Rovibrational spectrum of diatomic molecules-selection rules	Interaction of electrons with matter, Interaction of neutrons with matter (Elastic scattering, Inelastic scattering)	Theoretical	General questions +Exam
13	**2 hours**	Electronic transitions	Interaction of gamma radiation with matter (Photoelectric effect, Compton scattering, pair production)	Theoretical	General questions +Exam
14	**2 hours**	Frank-Condon principle	Attenuation of gamma rays Applications and solved problems	Theoretical	General questions +Exam
15	**2 hours**	Spectroscopic instrumentation	Monthly Exam in chapters 4 and 5	Theoretical	General questions +Exam

11. Course Evaluation

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

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Physics of atoms and molecules, B.H. Bransden and C.J.Joachain
Main references (sources)	Molecular spectroscopy", Jack D.Graybeal
Recommended books and references (scientific journals, reports...)	Wikipedia
Electronic References, Websites	Wikipedia

Course Description Form

1. Course Name:
Physical Optics
2. Course Code:
PHY 3527
3. Semester / Year:
First semester/ Third Stage
4. Description Preparation Date:
2024-4-2
5. Available Attendance Forms:
Weekly
6. Number of Credit Hours (Total) / Number of Units (Total)
30 hours
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Hammad R.Humud Dr. Asama Natiq Naji Dr. Omar Adnan Ibrahim Email: Hammad.Humud@sc.uobaghdad.edu.iq Asama.Naje@sc.uobaghdad.edu.iq Omar.Ibrahim@sc.uobaghdad.edu.iq
8. Course Objectives

Course Objectives	Teaching students the basic principles of physics. 2. Preparing specialists in the field of general physics and its practical applications, which bears the responsibility of studying the country's need for development and progress and capable of meeting the needs of the job market in state institutions and industry sectors. 3. Preparing an educated generation armed with science and adopts it as a sound basis to bring about radical changes and assign scientific knowledge and scientific methods in thinking, analysis and adaptation with the development of technologies, to keep up with the expansion of human needs. 4. Effective contribution for deepening and documenting the connection of the university with the society through the implementation of advisory counseling, training and development of teaching and administrative staff. 5. The service of preparing graduates specialized in physics who contribute to development in the country. 6. Meeting the needs of various sectors with highly qualified personals in the field of physics. 7. Encouraging the distinguished in this field to work as teaching assistants in the department to be part of the academic teaching staff in the future.

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

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	**2 hours**	Chapter1	Nature of light ,Historical review,Wave front and rays,Huygens principle,The electromagnetic spectrum , Source of electromagnetic waves	Theoretical	General questions +Exam
2	**2 hours**	Chapter2		Theoretical	General questions +Exam
3	**2 hours**	Chapter3	The wave nature of light, Electric constant and speed of light,Speed of light in a medium	Theoretical	General questions +Exam
4	**2 hours**	Chapter4	Plane harmonic waves and phase velocity, Plane harmonic waves in 1- D, Plane harmonic waves 3- D	Theoretical	General questions +Exam
5	**2 hours**	Chapter5		Theoretical	General questions +Exam
6	**2 hours**	Chapter6	alternative ways of representing harmonic eaves, group velocity , electromagnetic theory (Maxell equation), transverse waves, independence of electric and magnetic field, energy density and flow, examples	Theoretical	General questions +Exam
7	**2 hours**			Theoretical	Exam
8	**2 hours**	Chapter7	reflection and refraction	Theoretical	General questions +Exam
9	**2 hours**	Chapter8	reflection and refraction ,low of reflection and refraction , Fresnel's formulae	Theoretical	General questions +Exam
10	**2 hours**	Chapter9	Reflected and transmitted energy, Normal incident	Theoretical	General questions +Exam
11	**2 hours**	Chapter10		Theoretical	General questions +Exam
12	**2 hours**	Chapter11	Total internal reflection, Reflection from conductor	Theoretical	General questions +Exam

13	**2 hours**	Chapter12	the superposition	Theoretical	General questions +Exam
14	**2 hours**	Chapter1	the superposition of waves ,addition of simple harmonic motion along the same line superposition of many waves with random phase, addition of simple harmonic motions at right angles	Theoretical	General questions +Exam
15	**2 hours**	Chapter13		Theoretical	General questions +Exam
16	**2 hours**	Chapter14	**Final Exam**	Theoretical	

11. Course Evaluation

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

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Introduction to modern optics by G. Fowels.
Main references (sources)	None
Recommended books and references (scientific journals, reports…)	Wikipedia
Electronic References, Websites	Wikipedia

Course Description Form

1. Course Name:
Quantum Mechanics (1)
2. Course Code:
PHY 3528
3. Semester / Year:
First semester/ Third Stage
4. Description Preparation Date:
2024-4-2
5. Available Attendance Forms:
Weekly
6. Number of Credit Hours (Total) / Number of Units (Total)
30 hours
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Wasan Z. Majeed Email: Wasan.majeed@sc.uobaghdad.edu.iq
8. Course Objectives

Course Objectives	Teaching students the basic principles of physics. 2. Preparing specialists in the field of general physics and its practical applications, which bears the responsibility of studying the country's need for development and progress and capable of meeting the needs of the job market in state institutions and industry sectors. 3. Preparing an educated generation armed with science and adopts it as a sound basis to bring about radical changes and assign scientific knowledge and scientific methods in thinking, analysis and adaptation with the development of technologies, to keep up with the expansion of human needs. 4. Effective contribution for deepening and documenting the connection of the university with the society through the implementation of advisory counseling, training and development of teaching and administrative staff. 5. The service of preparing graduates specialized in physics who contribute to development in the country. 6. Meeting the needs of various sectors with highly qualified personals in the field of physics. 7. Encouraging the distinguished in this field to work as teaching assistants in the department to be part of the academic teaching staff in the future.

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

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	**2 hours**	Chapter1	The origin of quantum Mechanic, shortcomings of the old quantum theory	Theoretical	General questions +Exam
2	**2 hours**	Chapter2	The uncertainty and Complementary principles, the wave-particle duality	Theoretical	General questions +Exam
3	**2 hours**	Chapter3	Derivation of Schrödinger equation, Interpretation of the wave function	Theoretical	General questions +Exam
4	**2 hours**	Chapter4	Properties of the wave function, probability, normalization, probability current density, applications	Theoretical	General questions +Exam
5	**2 hours**	Chapter5	Time-independent Schrödinger equation, stationary states	Theoretical	General questions +Exam
6	**2 hours**	Chapter6	Simultaneous eigen functions, eigen values and eigen functions	Theoretical	General questions +Exam
7	**2 hours**		Mid Term Exam	Theoretical	Exam
8	**2 hours**	Chapter7	Degeneracy, Hermitian operator, expectation values-Variance, Deviations, and Dirac bracket notation	Theoretical	General questions +Exam
9	**2 hours**	Chapter8	Commute Operators, Ehrenfest Theorem	Theoretical	General questions +Exam
10	**2 hours**	Chapter9	Solutions of some one-Dimensional Systems, Potential Step	Theoretical	General questions +Exam
11	**2 hours**	Chapter10	The square well potential, Infinite square well potential	Theoretical	General questions +Exam
12	**2 hours**	Chapter11	The Harmonic oscillator: Polynomial solution, method of generating the Hermite polynomials	Theoretical	General questions +Exam
13	**2 hours**	Chapter12	Schrödinger equation in three coordinates	Theoretical	General questions +Exam
14	**2 hours**	Chapter1	The Hydrogen atom, angular momentum,	Theoretical	General questions +Exam
15	**2 hours**	Chapter13	spin-orbit interaction	Theoretical	General questions +Exam

16	**2 hours**	Chapter14	**Final Exam**	Theoretical	

11. Course Evaluation

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

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Introduction to Quantum Mechanics, D. Grifiths , second Edition.
Main references (sources)	Introduction to quantum mechanics, Dick and Wittike Introduction to quantum mechanics, D. Park
Recommended books and references (scientific journals, reports…)	none
Electronic References, Websites	Lecture Notes of Massachusetts Institute Technology

Course Description Form

1. Course Name:
Materials Physics (1)
2. Course Code:
PHY 3529
3. Semester / Year:
First semester/ Third Stage
4. Description Preparation Date:
2024-4-2
5. Available Attendance Forms:
Weekly
6. Number of Credit Hours (Total) / Number of Units (Total)
30 hours
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Farah Tariq M.Noori Email: farah.noorii@sc.uobaghdad.edu.iq
8. Course Objectives

Course Objectives	Teaching students the basic principles of physics. 2. Preparing specialists in the field of general physics and its practical applications, which bears the responsibility of studying the country's need for development and progress and capable of meeting the needs of the job market in state institutions and industry sectors. 3. Preparing an educated generation armed with science and adopts it as a sound basis to bring about radical changes and assign scientific knowledge and scientific methods in thinking, analysis and adaptation with the development of technologies, to keep up with the expansion of human needs. 4. Effective contribution for deepening and documenting the connection of the university with the society through the implementation of advisory counseling, training and development of teaching and administrative staff. 5. The service of preparing graduates specialized in physics who contribute to development in the country. 6. Meeting the needs of various sectors with highly qualified personals in the field of physics. 7. Encouraging the distinguished in this field to work as teaching assistants in the department to be part of the academic teaching staff in the future.

9. Teaching and Learning Strategies

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

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	**2 hours**	Chapter1	introduction to materials science: Levels of Structure, Structure – Property Relationship, Classification of Engineering Materials	Theoretical	General questions +Exam
2	**2 hours**	Chapter2	Introduction:Atomic structure, Bohr atomic Electronic and Atomic Structure Compound /Intermediate	Theoretical	General questions +Exam
3	**2 hours**	Chapter3	Crystal Structure: Fundamental Terms of Crystallography, Types of Crystal, Relation Between the Interplanar Distance and the Interatomic Distance.	Theoretical	General questions +Exam
4	**2 hours**	Chapter4	Crystal Structures of Materials, Simple Cubic Crystal Structure., Body Centred Cubic Structure , Face Centred Cubic Structure or Cubic Close Packed Structure, Hexagonal Closed Packed Structure	Theoretical	General questions +Exam
5	**2 hours**	Chapter5	Cohesion between atoms: Classification of Solids, Bonding in Solids, Classification of Bonds	Theoretical	General questions +Exam
6	**2 hours**	Chapter6	Crystal Imperfections: Classification of Imperfections, Surface / Interface , Point Defect or Imperfection, Line Imperfection	Theoretical	General questions +Exam
7	**2 hours**		Midterm Exam	Theoretical	Exam
8	**2 hours**	Chapter7	Surface Defect or Planar Defect, Volume Defect or Bulk Defect, Deformation in Metals	Theoretical	General questions +Exam
9	**2 hours**	Chapter8	Classification of Solids on the Basis of Band Theory, Classification of Conducting Materials.. Classification of Semiconductors , Insulator material	Theoretical	General questions +Exam
10	**2 hours**	Chapter9	Microstructural Evolution :Phase Diagram, Classification of alloys, Solid Solutions, Substitutional Solid	Theoretical	General questions +Exam

			Solutions, Interstitial Solid Solutions,		
11	**2 hours**	Chapter10	Mechanism of Crystallization, Solidification (or) Freezing, Cooling Curves, Solidification of pure metal : Super cooling, Solidification of Alloys, Nucleation,	Theoretical	General questions +Exam
12	**2 hours**	Chapter11	Nonferrous Alloys, Titanium and its Alloys	Theoretical	General questions +Exam
13	**2 hours**	Chapter12	Diffusion, Role of Diffusion, Diffusion Mechanism,	Theoretical	General questions +Exam
14	**2 hours**	Chapter1	Interstitial Mechanism, Atom Interchange Mechanism, Kirkendall effect	Theoretical	General questions +Exam
15	**2 hours**	Chapter13	steady and non-steady state diffusion, Fick's I law, Fick's II law, Factors affecting Diffusion,	Theoretical	General questions +Exam
16	**2 hours**		**Final exam**		

11. Course Evaluation

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

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Prof. Dr. Krishan Lal
Main references (sources)	President, Indian National Science Academy
Recommended books and references (scientific journals, reports…)	none
Electronic References, Websites	Wikipedia

Course Description Form

1. Course Name:
Photo Physics (elective)
2. Course Code:
PES 411
3. Semester / Year:
First semester/ Third Stage
4. Description Preparation Date:
2024-4-2
5. Available Attendance Forms:
Weekly
6. Number of Credit Hours (Total) / Number of Units (Total)
30 hours
7. Course administrator's name (mention all, if more than one name)
Name: Dr. **Firas Jawad Kadhim** Email: **Firas.Kadhim@sc.uobaghdad.edu.iq**
8. Course Objectives

Course Objectives	Teaching students the basic principles of physics. 2. Preparing specialists in the field of general physics and its practical applications, which bears the responsibility of studying the country's need for development and progress and capable of meeting the needs of the job market in state institutions and industry sectors. 3. Preparing an educated generation armed with science and adopts it as a sound basis to bring about radical changes and assign scientific knowledge and scientific methods in thinking, analysis and adaptation with the development of technologies, to keep up with the expansion of human needs. 4. Effective contribution for deepening and documenting the connection of the university with the society through the implementation of advisory counseling, training and development of teaching and administrative staff. 5. The service of preparing graduates specialized in physics who contribute to development in the country. 6. Meeting the needs of various sectors with highly qualified personals in the field of physics. 7. Encouraging the distinguished in this field to work as teaching assistants in the department to be part of the academic teaching staff in the future.

9. Teaching and Learning Strategies

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

10. Course Structure					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
1	**2 hours**	Chapter1	**Review of some basic principles of Molecular Physics- Rotation & vibration of molecules**	Theoretical	General questions +Exam
2	**2 hours**	Chapter2	**molecular spectral region- degeneracy & multiplicity of the molecular energy states- energy level diagram of molecules**	Theoretical	General questions +Exam
3	**2 hours**	Chapter3	**Some basic principles of Photophysics; Luminescence, photoluminescence & chemical luminescence, condensed aromatic hydrocarbons**	Theoretical	General questions +Exam
4	**2 hours**	Chapter4	**The photophysics processes; Absorption- quantitative aspects, .hot bands, photoluminescence: Fluorescence- quantitative aspects**	Theoretical	General questions +Exam
5	**2 hours**	Chapter5	**Phosphorescence, Delayed fluorescence,**	Theoretical	General questions +Exam
6	**2 hours**	Chapter6	**Non-radiative processes (Uni-molecular processes), internal conversion, intersystem crossing, Jabionskii diagram**	Theoretical	General questions +Exam
7	**2 hours**		**Exam**	Theoretical	Exam
8	**2 hours**	Chapter7	**Lifetime and transition probability, absorption spectrometers, fluorescence spectrometers, excitation fluorescence spectrum**	Theoretical	General questions +Exam
9	**2 hours**	Chapter8	**The kinetics of photo-luminescence; rate parameters, quantum efficiency**	Theoretical	General questions +Exam
10	**2 hours**	Chapter9	**Lifetime and quantum efficiency, Steady-state condition & Transient condition**	Theoretical	General questions +Exam
11	**2 hours**	Chapter10	**lifetime measurements, effect of temperature on lifetime**	Theoretical	General questions +Exam

12	**2 hours**	Chapter11	**Bi-molecular competing processes; collision impurity quenching**	Theoretical	General questions +Exam
13	**2 hours**	Chapter12	**energy transfer quenching & concentration quenching**	Theoretical	General questions +Exam
14	**2 hours**	Chapter 13	**self-absorption quenching**	Theoretical	General questions +Exam
15	**2 hours**		**Final Exam**	Theoretical	General questions +Exam

11. Course Evaluation

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

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Photoluminescence of solutions- **C. A. Parker.**
Main references (sources)	Photophysics of aromatic molecules- **J.B. Birks.**
Recommended books and references (scientific journals, reports…)	none
Electronic References, Websites	Wikipedia

Course Description Form

1. Course Name:
SOLAR ENERGY APPLICATIONS(elective)
2. Course Code:
PHY3531−2
3. Semester / Year:
First semester/ Third Stage
4. Description Preparation Date:
2024-4-2
5. Available Attendance Forms:
Weekly
6. Number of Credit Hours (Total) / Number of Units (Total)
30 hours
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Manal Midhat Abdullah Email: Manal.m@sc.uobaghdad.edu.iq
8. Course Objectives

Course Objectives	Teaching students the basic principles of physics. 2. Preparing specialists in the field of general physics and its practical applications, which bears the responsibility of studying the country's need for development and progress and capable of meeting the needs of the job market in state institutions and industry sectors. 3. Preparing an educated generation armed with science and adopts it as a sound basis to bring about radical changes and assign scientific knowledge and scientific methods in thinking, analysis and adaptation with the development of technologies, to keep up with the expansion of human needs. 4. Effective contribution for deepening and documenting the connection of the university with the society through the implementation of advisory counseling, training and development of teaching and administrative staff. 5. The service of preparing graduates specialized in physics who contribute to development in the country. 6. Meeting the needs of various sectors with highly qualified personals in the field of physics. 7. Encouraging the distinguished in this field to work as teaching assistants in the department to be part of the academic teaching staff in the future.

9. Teaching and Learning Strategies

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

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2 hours	Chapter1	Physical expression and measurement of energy,	Theoretical	1
2	2 hours	Chapter2	Forms of energy	Theoretical	2
3	2 hours	Chapter3	the sun and the electromagnetic spectrum, the sun parameters	Theoretical	3
4	2 hours	Chapter4	the radiation on earth	Theoretical	4
5	2 hours	Chapter5	the radiation measurements instruments,	Theoretical	5
6	2 hours	Chapter6	the transmission, absorption, and reflection through a transparent medium	Theoretical	6
7	2 hours		**exam**	Theoretical	7
8	2 hours	Chapter7	Solar cells (theory and applications)	Theoretical	8
9	2 hours	Chapter8	solar collectors (theory, types, and applications)	Theoretical	9
10	2 hours	Chapter9	wind energy (windmills theory and applications)	Theoretical	10
11	2 hours	Chapter10	solar cookers, and solar drying (description, advantages, and applications)	Theoretical	11
12	2 hours	Chapter11	Hydroelectric Power (theory)	Theoretical	12
13	2 hours	Chapter12	biomass energy (theory and applications)	Theoretical	13
14	2 hours	Chapter 13	geothermal energy (theory and advantages)	Theoretical	14
15	2 hours	Chapter 14	wave energy ((theory and applications)	Theoretical	15

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)	Fundamentals and applications of renewable energy, by Mehhmet Kanoglu/ Mc Graw Hill, 2019, ISBN: 1260455300 / 9781260455304
Main references (sources)	Renewables: The Politics of a Global Energy, by Michael Aklin and Johannes Urpelainen, (The MIT Press), 2018
Recommended books and references (scientific journals, reports…)	None
Electronic References, Websites	Introducing renewable energy

Course Description Form

1. Course Name:
Elementary Particles (elective)
2. Course Code:
PHY3531−3
3. Semester / Year:
First semester/ Third Stage
4. Description Preparation Date:
2024-4-2
5. Available Attendance Forms:
Weekly
6. Number of Credit Hours (Total) / Number of Units (Total)
30 hours
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Rana Muhi Yas Email: rana.yas@sc.uobaghdad.edu.iq
8. Course Objectives

Course Objectives	Teaching students the basic principles of physics. 2. Preparing specialists in the field of general physics and its practical applications, which bears the responsibility of studying the country's need for development and progress and capable of meeting the needs of the job market in state institutions and industry sectors. 3. Preparing an educated generation armed with science and adopts it as a sound basis to bring about radical changes and assign scientific knowledge and scientific methods in thinking, analysis and adaptation with the development of technologies, to keep up with the expansion of human needs. 4. Effective contribution for deepening and documenting the connection of the university with the society through the implementation of advisory counseling, training and development of teaching and administrative staff. 5. The service of preparing graduates specialized in physics who contribute to development in the country. 6. Meeting the needs of various sectors with highly qualified personals in the field of physics. 7. Encouraging the distinguished in this field to work as teaching assistants in the department to be part of the academic teaching staff in the future.

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

10. Course Structure					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
1	**2 hours**	Chapter1	Introduction to Elementary Particles Historical overview of the development of particle physics	Theoretical	1
2	**2 hours**	Chapter2	Hadrons, leptons and quarks	Theoretical	2
3	**2 hours**	Chapter3	The fundamental interactions and Feynman diagrams	Theoretical	3
4	**2 hours**	Chapter4	Quark flavours and baryonic number	Theoretical	4
5	**2 hours**	Chapter5	Leptonic flavours and lepton number	Theoretical	5
6	**2 hours**	Chapter6	The quark model	Theoretical	6
7	**2 hours**		Exam	Theoretical	7
8	**2 hours**	Chapter7	Mesons and Baryons	Theoretical	8
9	**2 hours**	Chapter8	The standard model	Theoretical	9
10	**2 hours**	Chapter9	The electro-weak interaction	Theoretical	10
11	**2 hours**	Chapter10	Electro-weak unification	Theoretical	11
12	**2 hours**	Chapter11	The intermediate vector bosons	Theoretical	12
13	**2 hours**	Chapter12	The interaction between intermediate bosons	Theoretical	13
14	**2 hours**	Chapter 13	Higgs mechanism	Theoretical	14
15	**2 hours**	Chapter 14	Properties of the Higgs boson	Theoretical	15

11. Course Evaluation	
Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc	
12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Introduction to Elementary Particles. By David Grhffiths.
Main references (sources)	An Introduction to Particle Physics and the Standard Model
Recommended books and references (scientific journals, reports…)	None
Electronic References, Websites	Lecture Notes in Elementary Particles

Course Description Form

1. Course Name:
Thin Film Physics (elective)
2. Course Code:
PHY3531-4
3. Semester / Year:
First semester/ Third Stage
4. Description Preparation Date:
2024-4-2
5. Available Attendance Forms:
Weekly
6. Number of Credit Hours (Total) / Number of Units (Total)
30 hours
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Dr. Salma Mahdi Shaban Email: salma.shaban@sc.uobaghdad.edu.iq
8. Course Objectives

Course Objectives	Teaching students the basic principles of physics. 2. Preparing specialists in the field of general physics and its practical applications, which bears the responsibility of studying the country's need for development and progress and capable of meeting the needs of the job market in state institutions and industry sectors. 3. Preparing an educated generation armed with science and adopts it as a sound basis to bring about radical changes and assign scientific knowledge and scientific methods in thinking, analysis and adaptation with the development of technologies, to keep up with the expansion of human needs. 4. Effective contribution for deepening and documenting the connection of the university with the society through the implementation of advisory counseling, training and development of teaching and administrative staff. 5. The service of preparing graduates specialized in physics who contribute to development in the country. 6. Meeting the needs of various sectors with highly qualified personals in the field of physics. 7. Encouraging the distinguished in this field to work as teaching assistants in the department to be part of the academic teaching staff in the future.

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

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	**2 hours**	Chapter1	**Thin Film Technology:-** Thermal Evaporation, Cathodic Sputtering, Chemical Methods, Chemical Vapor Deposition (CVD), Vacuum-deposition Apparatus	Theoretical	1
2	**2 hours**	Chapter2	**Thickness Measurement and Analytical Techniques:-** Electrical Methods, Analytical Techniques, Volume Structure	Theoretical	2
3	**2 hours**	Chapter3	**Mechanical Effects In Thin Films: -** Internal Stresses, Mechanical Properties, Adhesion of Films.	Theoretical	3
4	**2 hours**	Chapter4	**Electron Transport Phenomena In Metals Films:-** Electrical Conduction in Discontinuous Films, Electrical Conduction in Continuous Films, Galvan magnetic Size Effects in Thin Film.	Theoretical	4
5	**2 hours**	Chapter5	**Electron Transport Phenomena In Metals Films: -** Transport of Hot Electrons, Thermal Conductivity, Thermoelectric Power, Heat Transport across Film-Insulator Interface.	Theoretical	5
6	**2 hours**	Chapter6	**Transport Phenomena In Semiconducting Films:-** Mobility; Galvan magnetic Surface Effects; Anisotropy Effects; Quantum Size Effects, Transport Properties of Thick Films,	Theoretical	6
7	**2 hours**		**Exam**	Theoretical	7

8	**2 hours**	Chapter7	**Transport Phenomena In Semiconducting Films: -** Photoconduction in Semiconductor Films, Activation Process, Photoconductivity Mechanisms, Field Effect - Thin-film Transistor (TFT).	Theoretical	8
9	**2 hours**	Chapter8	**Transport Phenomena In Insulator Films: -** Dielectric Properties (Thin Films, Thick Films, Dielectric Losses), Piezoelectric Films.	Theoretical	9
10	**2 hours**	Chapter9	**Electrical Conduction in Insulator Films: -** Conduction Mechanisms, Thermionic (Schottky) Emission,	Theoretical	10
11	**2 hours**	Chapter10	**Electrical Conduction in Insulator Films: -** Quantum-mechanical Tunneling, Theories; Image-force Correction; Temperature-field (TF) Emission; Temperature Dependence.	Theoretical	11
12	**2 hours**	Chapter11	Bulk-limited Conduction:- Tunnel Emission (Hot-electron Transport), Tunnel Spectroscopy,	Theoretical	12
13	**2 hours**	Chapter12	Photoeffects in Tunnel Structures:- Electroluminescence, Photoconduction and Photoemission	Theoretical	13
14	**2 hours**	Chapter 13	Optical Properties Of Thin Films:- Thin Film Optics (Reflection and Transmission at an Interface, Reflection and Transmission by a Single Film, Anisotropic and Inhomogeneous Films, Multilayer Films, Optical Absorption).	Theoretical	14
15	**2 hours**	Chapter 14	Optical Properties Of Thin Films:- Optical Constants of Thin Films, Thin Film Absorption and	Theoretical	15

			Photoemission Phenomena, Multilayer Optical Systems		

11. Course Evaluation

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

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	(1) Introduction to Nanophysics Prof. J. Raynien Kwo, Department of Physics National Tsing Hua University (2) Nanomaterials & Nanotechnology, Dr. Pallab Ghosh,Department of Chemical Engineering ,IIT Guwahati, Guwahati–781039,India
Main references (sources)	Nanotechnology and Nanoelectronics, W.R. fahrener, materials, devices, techniques
Recommended books and references (scientific journals, reports…)	None
Electronic References, Websites	Wikipedia

Course Description Form

1. Course Name:
Powder Physics (elective)
2. Course Code:
PHY3531-5
3. Semester / Year:
First semester/ Third Stage
4. Description Preparation Date:
2024-4-2
5. Available Attendance Forms:
Weekly
6. Number of Credit Hours (Total) / Number of Units (Total)
30 hours
7. Course administrator's name (mention all, if more than one name)
Name: Dr.Ban Mazin Muzahem Email: ban.muzahem@sc.uobaghdad.edu.iq
8. Course Objectives

Course Objectives	Teaching students the basic principles of physics. 2. Preparing specialists in the field of general physics and its practical applications, which bears the responsibility of studying the country's need for development and progress and capable of meeting the needs of the job market in state institutions and industry sectors. 3. Preparing an educated generation armed with science and adopts it as a sound basis to bring about radical changes and assign scientific knowledge and scientific methods in thinking, analysis and adaptation with the development of technologies, to keep up with the expansion of human needs. 4. Effective contribution for deepening and documenting the connection of the university with the society through the implementation of advisory counseling, training and development of teaching and administrative staff. 5. The service of preparing graduates specialized in physics who contribute to development in the country. 6. Meeting the needs of various sectors with highly qualified personals in the field of physics. 7. Encouraging the distinguished in this field to work as teaching assistants in the department to be part of the academic teaching staff in the future.

9. Teaching and Learning Strategies

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

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2 hours	Chapter1	Introduction to Powder Metallurgy Powder Metallurgy materials	Theoretical	1
2	2 hours	Chapter2	Powder Manufacture: a. Mechanical Processes 1. Machining 2. Crushing 3. Milling 4. Shotting 5. Graining 6. Atomization 7. Cold Stream Process	Theoretical	2
3	2 hours	Chapter3	Powder Manufacture:. chemical reactions, liquid metal atomization and electrolytic deposition.	Theoretical	3
4	2 hours	Chapter4	Powder characterization: particle shape, size and distribution, surface area, Particle porosity, Particle microstructure	Theoretical	4
5	2 hours	Chapter5	Particle Size Measurement Technique	Theoretical	5
6	2 hours	Chapter6	Powder preparation: mixing and blending, powder lubrication, flow, apparent density, compressibility	Theoretical	6
7	2 hours		Exam	Theoretical	7
8	2 hours	Chapter7	Shaping and compacting: fundamentals of	Theoretical	8

			compacting, cold compacting with dies, design guidelines, isostatic compacting		
9	**2 hours**	Chapter8	Sintering: fundamentals and sintering theory, mixed powder, liquid phase sintering, effect of sintering atmospheres, sintering furnaces	Theoretical	9
10	**2 hours**	Chapter9	Factors effecting sintering	Theoretical	10
11	**2 hours**	Chapter10	Properties of sintered steel: effect of density, alloying elements, and impurities	Theoretical	11
12	**2 hours**	Chapter11	Application of P/M materials: filter; bearings, structural parts, powder forged parts	Theoretical	12
13	**2 hours**	Chapter12	Experiments: powder characteristics, compressibility, sintering, mechanical properties, microstructure	Theoretical	13
14	**2 hours**	Chapter 13	Metal Carbides, Methods for preparing Metal Carbides	Theoretical	14
15	**2 hours**	Chapter 14	Composite and the use of metal powder as a filler	Theoretical	15

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)	An Introduction to Extractive Metallurgy, Metallurgy
Main references (sources)	Powder technology Handbook, third Edition
Recommended books and references (scientific journals, reports…)	None
Electronic References, Websites	Wikipedia

Course Description Form

1. Course Name:
High Voltages Physics (elective)
2. Course Code:
PHY3531-6
3. Semester / Year:
First semester/ Third Stage
4. Description Preparation Date:
2024-4-2
5. Available Attendance Forms:
Weekly
6. Number of Credit Hours (Total) / Number of Units (Total)
30 hours
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Thamir H. Khalaf Email: Thamir.Khalaf@sc.uobaghdad.edu.iq

8. Course Objectives	
Course Objectives	Teaching students the basic principles of physics. 2. Preparing specialists in the field of general physics and its practical applications, which bears the responsibility of studying the country's need for development and progress and capable of meeting the needs of the job market in state institutions and industry sectors. 3. Preparing an educated generation armed with science and adopts it as a sound basis to bring about radical changes and assign scientific knowledge and scientific methods in thinking, analysis and adaptation with the development of technologies, to keep up with the expansion of human needs. 4. Effective contribution for deepening and documenting the connection of the university with the society through the implementation of advisory counseling, training and development of teaching and administrative staff. 5. The service of preparing graduates specialized in physics who contribute to development in the country. 6. Meeting the needs of various sectors with highly qualified personals in the field of physics. 7. Encouraging the distinguished in this field to work as teaching assistants in the department to be part of the academic teaching staff in the future.

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

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	**2 hours**	Chapter1	Introduction: Generation and transmission of electric energy, Voltage stresses, Testing voltages, Power frequency voltages, Lightning impulse voltages, Switching impulses, D.C. voltages, Very low frequency voltage.	Theoretical	1
2	**2 hours**	Chapter2	Direct voltages, A.C. to D.C. conversion, Electrostatic generators, Alternating voltages, Testing transformers, Series resonant circuits.	Theoretical	2
3	**2 hours**	Chapter3	Impulse voltages, Impulse voltage generator circuits, Operation, design and construction of impulse generators, Control systems.	Theoretical	3
4	**2 hours**	Chapter4	Measurement of high voltages: Peak voltage measurements by spark gaps, Sphere gaps, Reference measuring systems, Uniform field gaps, Rod gaps.	Theoretical	4
5	**2 hours**	Chapter5	Electrostatic voltmeters, Ammeter in series with high ohmic resistors and high ohmic resistor voltage Dividers, Generating voltmeters and field sensors, The measurement of peak voltages, The Chubb–Fortescue method, Voltage dividers and passive rectifier circuits.	Theoretical	5
6	**2 hours**	Chapter6	Voltage dividing systems and impulse voltage measurements, Generalized voltage generation and measuring circuit, Demands upon transfer characteristics of the measuring system, Fundamentals for the computation of the measuring system, Voltage dividers.	Theoretical	6
7	**2 hours**		**Exam.**	Theoretical	7

8	**2 hours**	Chapter7	Fast digital transient recorders for impulse measurements, Principles and historical development of transient digital recorders, Errors inherent in digital recorders, Specification of ideal A/D recorder and parameters required for h.v impulse testing.	Theoretical	8
9	**2 hours**	Chapter8	Electrostatic fields and field stress control: Electrical field distribution and breakdown strength of insulating materials.	Theoretical	9
10	**2 hours**	Chapter9	Fields in homogeneous, isotropic materials, The uniform field electrode arrangement, Coaxial cylindrical and spherical fields, Sphere-to-sphere or sphere-to-plane.	Theoretical	10
11	**2 hours**	Chapter10	Fields in multi-dielectric, isotropic materials, Simple configurations, Dielectric refraction, Stress control by floating screens.	Theoretical	11
12	**2 hours**	Chapter11	Numerical methods, Finite difference method (FDM), Finite element method (FEM).	Theoretical	12
13	**2 hours**	Chapter12	Charge simulation method (CSM), Boundary element method.	Theoretical	13
14	**2 hours**	Chapter 13	Effect of electrical currents on the human body, Electrical clearances, Safety signs and working, procedures, Capacitive and Inductive Coupling, Floating Objects, Current Loops.	Theoretical	14
15	**2 hours**	Chapter 14	Safety Earthing, Working earths, Step and Touch Potential, Equipotential Platforms and Voltage Transfer, Safety in the High Voltage Laboratory, Review Questions.	Theoretical	15

11. Course Evaluation

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

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	1- E. Kuffel, W.S. Zaengl, and J. Kuffel "High Voltage Engineering Fundamentals" Second edition 2000, published by Butterworth-Heinemann.
Main references (sources)	1. M.S. Naidu and V. Kamaraju, *High Voltage Engineering,* Tata McGraw-Hill, 4th Edition, 2009. 2. J.P. Holtzhausen, W.L. Vosloo "High Voltage Engineering Practice and Theory", ISBN: 978 - 0 - 620 - 3767 – 7. 3. C.L. Wadhwa, "High Voltage Engineering", Third Edition, New Age International Publishers.
Recommended books and references (scientific journals, reports…)	None
Electronic References, Websites	Wikipedia

Course Description Form

1. Course Name:
Virtual Lab.
2. Course Code:
PPP 321
3. Semester / Year:
First semester/ Third Stage
4. Description Preparation Date:
2024-4-2
5. Available Attendance Forms:
Weekly
6. Number of Credit Hours (Total) / Number of Units (Total)
30 hours
7. Course administrator's name (mention all, if more than one name)
Name Dr. Email: saad.mohmmed@sc.uobaghdad.edu.iq
8. Course Objectives

Course Objectives	Teaching students the basic principles of physics. 2. Preparing specialists in the field of general physics and its practical applications, which bears the responsibility of studying the country's need for development and progress and capable of meeting the needs of the job market in state institutions and industry sectors. 3. Preparing an educated generation armed with science and adopts it as a sound basis to bring about radical changes and assign scientific knowledge and scientific methods in thinking, analysis and adaptation with the development of technologies, to keep up with the expansion of human needs. 4. Effective contribution for deepening and documenting the connection of the university with the society through the implementation of advisory counseling, training and development of teaching and administrative staff. 5. The service of preparing graduates specialized in physics who contribute to development in the country. 6. Meeting the needs of various sectors with highly qualified personals in the field of physics. 7. Encouraging the distinguished in this field to work as teaching assistants in the department to be part of the academic teaching staff in the future.

9. Teaching and Learning Strategies

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

10. Course Structure					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
1	**2 hours**		introduction	Experimental simulation	General questions +Exam
2	**2 hours**	**First experiment**	Photoelectric effect	Experimental simulation	General questions +Exam
3	**2 hours**	**second experiment**	Pendulum lab.	Experimental simulation	General questions +Exam
4	**2 hours**	**Third experiment**	Bouncy	Experimental simulation	General questions +Exam
5	**2 hours**	**Fourth experiment**	Mass and sipring	Experimental simulation	General questions +Exam
6	**2 hours**	**Fifth experiment**	Vector edition	Experimental simulation	General questions +Exam
7	**2 hours**		**Exam**	Experimental simulation	Exam
8	**2 hours**	**Sixth experiment**	Energy skate park	Experimental simulation	General questions +Exam
9	**2 hours**	**Seventh experiment**	Black body spectrum	Experimental simulation	General questions +Exam
10	**2 hours**	**Eighth experiment**	Wave on string	Experimental simulation	General questions +Exam
11	**2 hours**	**Ninth experiment**	Molecule and light	Experimental simulation	General questions +Exam
12	**2 hours**		**Review experiment**		
13	**2 hours**		**Month exam**		
14	**2 hours**				
15	**2 hours**				
16	**2 hours**	**Final Exam**		**Final Exam**	

11. Course Evaluation	
Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc	
12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Lab. book
Main references (sources)	Fundamental of physics,9 th editi 2011
Recommended books and references (scientific journals, reports…)	Any physics book and journal in library
Electronic References, Websites	Wikipedia, PhET simulation

Course Description Form

1. Course Name:
Virtual Lab.
2. Course Code:
PPP 321
3. Semester / Year:
First semester / First Stage
4. Description Preparation Date:
2024-4-2
5. Available Attendance Forms:
Weekly
6. Number of Credit Hours (Total) / Number of Units (Total)
30 hours
7. Course administrator's name (mention all, if more than one name)
Name Dr. Email: saad.mohmmed@sc.uobaghdad.edu.iq
8. Course Objectives

Course Objectives	Teaching students the basic principles of physics. 2. Preparing specialists in the field of general physics and its practical applications, which bears the responsibility of studying the country's need for development and progress and capable of meeting the needs of the job market in state institutions and industry sectors. 3. Preparing an educated generation armed with science and adopts it as a sound basis to bring about radical changes and assign scientific knowledge and scientific methods in thinking, analysis and adaptation with the development of technologies, to keep up with the expansion of human needs. 4. Effective contribution for deepening and documenting the connection of the university with the society through the implementation of advisory counseling, training and development of teaching and administrative staff. 5. The service of preparing graduates specialized in physics who contribute to development in the country. 6. Meeting the needs of various sectors with highly qualified personals in the field of physics. 7. Encouraging the distinguished in this field to work as teaching assistants in the department to be part of the academic teaching staff in the future.

9. Teaching and Learning Strategies

Strategy	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive

	tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	**2 hours**		introduction	Experimental simulation	General questions +Exam
2	**2 hours**	**First experiment**	Determination of the Refractive Index of a medium by different Methods	Experimental simulation	General questions +Exam
3	**2 hours**	**second experiment**	Determination the Focal Length of Convex Lens	Experimental simulation	General questions +Exam
4	**2 hours**	**Third experiment**	Focal Length of The Concave Lens	Experimental simulation	General questions +Exam
5	**2 hours**	**Fourth experiment**	Aberration of Lenses	Experimental simulation	General questions +Exam
6	**2 hours**	**Fifth experiment**	The prism and estimation its dispersion and resolving powers	Experimental simulation	General questions +Exam
7	**2 hours**	**Fifth experiment**	Interference of light – Young's double – slit interference exp	Experimental simulation	Exam
8	**2 hours**	**Sixth experiment**	Estimation Light Wavelength Via Lloyd's Mirror / Fresnel's Prism Interference	Experimental simulation	General questions +Exam
9	**2 hours**	**Seventh experiment**	Michelson Interferometer	Experimental simulation	General questions +Exam
10	**2 hours**	**Eighth experiment**	Fabry – Perot Interferometer	Experimental simulation	General questions +Exam

11	**2 hours**	**Ninth experiment**	Determination the Diameter of a Fine Wire by Interference Phenomenon	Experimental simulation	General questions +Exam
12	**2 hours**		Review experiment		
13	**2 hours**		Monthly exam		
14	**2 hours**				
15	**2 hours**				
16	**2 hours**	**Final Exam**		**Final Exam**	

11. Course Evaluation

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

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	• 1-F. Sears, Addison-Wesley publishing company, Optics 1964 . • 2-F. Jenkins& H. White, Fundamentals of Optics by, McGraw Hill book company, 4th edition, 1985
Main references (sources)	• Halliday, Resnick and Walker; Fundamentals of Physics; 8th edition 2008. • 2-F. Sears, Addison-Wesley publishing company, Optics 1964 . • 3-F. Jenkins& H. White, Fundamentals of Optics by, McGraw Hill book company, 4th edition, 1985
Recommended books and references (scientific journals, reports…)	• sheet lab.Experiments
Electronic References, Websites	Wikipedia,

Course Description Form

1. Course Name:
Mathematical physics
2. Course Code:
PHY 3632
3. Semester / Year:
Second semester / Third Stage
4. Description Preparation Date:
2024-4-2
5. Available Attendance Forms:
Weekly
6. Number of Credit Hours (Total) / Number of Units (Total)
30 hours
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Arkan Rifaah Ridha. Dr. Ahmed Qasim. Dr. Omar Abdulsada Ali Dr. Zainab Hadi Email: Arkan.Ridha@sc.uobaghdad.edu.iq ahmedqasim3@gmail.com omar.ab@sc.uobaghdad.edu.iq Zainab.mahmood@sc.uobagdad.edu.iq
8. Course Objectives

Course Objectives	Teaching students the basic principles of physics. 2. Preparing specialists in the field of general physics and its practical applications, which bears the responsibility of studying the country's need for development and progress and capable of meeting the needs of the job market in state institutions and industry sectors. 3. Preparing an educated generation armed with science and adopts it as a sound basis to bring about radical changes and assign scientific knowledge and scientific methods in thinking, analysis and adaptation with the development of technologies, to keep up with the expansion of human needs. 4. Effective contribution for deepening and documenting the connection of the university with the society through the implementation of advisory counseling, training and development of teaching and administrative staff. 5. The service of preparing graduates specialized in physics who contribute to development in the country. 6. Meeting the needs of various sectors with highly qualified personals in the field of physics. 7. Encouraging the distinguished in this field to work as teaching assistants in the department to be part of the academic teaching staff in the future.

9. Teaching and Learning Strategies

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

10. Course Structure

Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
1	**2 hours**	**Chapter 1**	Green's theorem in the plane	Theoretical	General questions +Exam
2	**2 hours**		Solved problems	Theoretical	General questions +Exam
3	**2 hours**		Divergence theorem	Theoretical	General questions +Exam
4	**2 hours**		Solved problems	Theoretical	General questions +Exam
5	**2 hours**		Stoke's theorem+ solved problems	Theoretical	General questions +Exam
6	**2 hours**	**Chapter 2**	Complex numbers + Solved problems	Theoretical	General questions +Exam
7	**2 hours**		**Exam**	Theoretical	Exam
8	**2 hours**		Geometrical representation of imaginary numbers+ Argand diagram + Solved problems	Theoretical	General questions +Exam
9	**2 hours**		Absolute values of complex numbers+ Solved problems	Theoretical	General questions +Exam
10	**2 hours**		Euler's formula + Demoivre's theorem + Solved problems	Theoretical	General questions +Exam
11	**2 hours**	**Chapter 3**	Expressions for $\cos n\theta$ and $\sin n\theta$ in terms of $\cos^n \theta$ and $\sin^n \theta$+ Solved problems	Theoretical	General questions +Exam
12	**2 hours**		Expressions for $\cos^n \theta$ and $\sin^n \theta$ in terms of sines and cosines of	Theoretical	General questions +Exam

			multiples of θ+ Solved problems		
13	**2 hours**		Roots of complex numbers+ Solved problems	Theoretical	General questions +Exam
14	**2 hours**		Natural logarithm (ln) of a complex number+ Solved problems	Theoretical	General questions +Exam
15	**2 hours**		Functions of complex variables + Solved problems	Theoretical	General questions +Exam

11. Course Evaluation

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

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	• George B. Thomas, Maurice D. Weir, Joel Hass, Frank R. Giordano "Calculus", 11th edition, Media Upgrade, Pearson International edition (2004). • H. S. Weber and G. B. Arfken, "Essential Mathematics Methods for Physicists", 6th edition, Elsevier (2005). • C. Ray Wylie, "Advanced Engineering Mathematics", 4th edition (International Students Edition), Mcgraw-Hill (1975).
Main references (sources)	• Sokolnikoff and Redheffer, "Mathemat of Physics and ,"Modern Engineer Mcgraw-Hill (1958). • Murray R. Spiegel, "Vector analysis: a an introduction to tensor analys McGraw-Hill, Inc. (1959).
Recommended books and references (scientific journals, reports…)	Wikipedia
Electronic References, Websites	Wikipedia

Course Description Form

1. Course Name:
Quantum Mechanics (2)
2. Course Code:
PHY 3633
3. Semester / Year:
Second semester / Third Stage
4. Description Preparation Date:
2024-4-2
5. Available Attendance Forms:
Weekly
6. Number of Credit Hours (Total) / Number of Units (Total)
30 hours
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Ali Abdulateef Kareem Dr. Ghaith N. Flaiyh Email: Ali.kareem@sc.uobaghdad.edu.iq ghaith.flaiyh@sc.uobaghdad.edu.iq
8. Course Objectives

Course Objectives	Teaching students the basic principles of physics. 2. Preparing specialists in the field of general physics and its practical applications, which bears the responsibility of studying the country's need for development and progress and capable of meeting the needs of the job market in state institutions and industry sectors. 3. Preparing an educated generation armed with science and adopts it as a sound basis to bring about radical changes and assign scientific knowledge and scientific methods in thinking, analysis and adaptation with the development of technologies, to keep up with the expansion of human needs. 4. Effective contribution for deepening and documenting the connection of the university with the society through the implementation of advisory counseling, training and development of teaching and administrative staff. 5. The service of preparing graduates specialized in physics who contribute to development in the country. 6. Meeting the needs of various sectors with highly qualified personals in the field of physics. 7. Encouraging the distinguished in this field to work as teaching assistants in the department to be part of the academic teaching staff in the future.

9. Teaching and Learning Strategies

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

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	**2 hours**	Chapter1	Raising and lowering operators	Theoretical	General questions +Exam
2	**2 hours**	Chapter2	Eigen value and Eigen function	Theoretical	General questions +Exam
3	**2 hours**	Chapter3	Action of the raising and lowering operators	Theoretical	General questions +Exam
4	**2 hours**	Chapter4	Wave functions in coordinate representation	Theoretical	General questions +Exam
5	**2 hours**	Chapter5	The raising and lowering operators in Cartesian and spherical coordinates	Theoretical	General questions +Exam
6	**2 hours**	Chapter6	Eigen values and Eigen functions of the angular momentum operator and matrices	Theoretical	General questions +Exam
7	**2 hours**		**Exam**	Theoretical	Exam
8	**2 hours**	Chapter7	The spin angular momentum	Theoretical	General questions +Exam
9	**2 hours**	Chapter8	Approximation method II: the variational method, variational principle and its applications	Theoretical	General questions +Exam
10	**2 hours**	Chapter9	Time independent perturbation theory	Theoretical	General questions +Exam
11	**2 hours**	Chapter10	Non-degenerate and degenerate systems.	Theoretical	General questions +Exam
12	**2 hours**	Chapter11	Stark effect and Zeeman effect	Theoretical	General questions +Exam

13	**2 hours**	Chapter12	Time dependent perturbation theory	Theoretical	General questions +Exam
14	**2 hours**	Chapter1	Constant,	Theoretical	General questions +Exam
15	**2 hours**	Chapter13	sinusoidal perturbations and transition probability	Theoretical	General questions +Exam
16	**2 hours**		**Final Exam**	Theoretical	

11. Course Evaluation

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

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Introduction to quantum mechanics, D. J. Grifiths, 3rd Ed.
Main references (sources)	1. Modern physics and quantum mechanics, E. E. Anderson. 2. Introduction to quantum mechanics, Dick and Wittike. 3. Introduction to quantum mechanics, D. Park.
Recommended books and references (scientific journals, reports…)	none
Electronic References, Websites	Wikipedia

Course Description Form

1. Course Name:
Materials Physics (2)
2. Course Code:
PHY 3634
3. Semester / Year:
Second semester / Third Stage
4. Description Preparation Date:
2024-4-2
5. Available Attendance Forms:
Weekly
6. Number of Credit Hours (Total) / Number of Units (Total)
30 hours
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Farah Tariq M.Noori Email: farah.noori@sc.uobaghdad.edu.iq
8. Course Objectives

Course Objectives	Teaching students the basic principles of physics. 2. Preparing specialists in the field of general physics and its practical applications, which bears the responsibility of studying the country's need for development and progress and capable of meeting the needs of the job market in state institutions and industry sectors. 3. Preparing an educated generation armed with science and adopts it as a sound basis to bring about radical changes and assign scientific knowledge and scientific methods in thinking, analysis and adaptation with the development of technologies, to keep up with the expansion of human needs. 4. Effective contribution for deepening and documenting the connection of the university with the society through the implementation of advisory counseling, training and development of teaching and administrative staff. 5. The service of preparing graduates specialized in physics who contribute to development in the country. 6. Meeting the needs of various sectors with highly qualified personals in the field of physics. 7. Encouraging the distinguished in this field to work as teaching assistants in the department to be part of the academic teaching staff in the future.

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

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	**2 hours**	Chapter1	Mechanical Properties and their Measurements, Strengthening Mechanism to Improve the Mechanical Properties, Fracture.	Theoretical	General questions +Exam
2	**2 hours**	Chapter2	Thermal properties: Heat Capacity, Thermal Expansion.	Theoretical	General questions +Exam
3	**2 hours**	Chapter3	Thermal Conductivity, Melting Point, Thermal Stress	Theoretical	General questions +Exam
4	**2 hours**	Chapter4	Classification of Optical Materials, Optical Properties of Materials, Excitons, Colour Centres	Theoretical	General questions +Exam
5	**2 hours**	Chapter5	Types of Dielectric Materials, Definitions, Claussius-Mosotti Equation, Experimental Determination of Dielectric Constant	Theoretical	General questions +Exam
6	**2 hours**	Chapter6	Composite Materials :Classification of the Composite Materials, Particle Reinforced Composites .	Theoretical	General questions +Exam
7	**2 hours**		**Exam**	Theoretical	Exam
8	**2 hours**	Chapter7	Fiber Reinforced Composites, Processing Techniques for Composite Materials, Applications.	Theoretical	General questions +Exam
9	**2 hours**	Chapter8	Advanced Ceramic: Classification of Ceramics, Structure of Ceramics, Ceramic Fabrication and properties	Theoretical	General questions +Exam
10	**2 hours**	Chapter9	Classification of Polymers , Structure of Polymer and properties	Theoretical	General questions +Exam
11	**2 hours**	Chapter10	Origin of Metallic Glasses, Classification of Nonlinear Materials.	Theoretical	General questions +Exam
12	**2 hours**	Chapter11	Biomechanism, Classification of Biomaterials, Synthesis of Nanostructured Materials	Theoretical	General questions +Exam

13	**2 hours**	Chapter12	Characterization of material: Diffraction of X-rays, Bragg's Law and Crystal Structures	Theoretical	General questions +Exam
14	**2 hours**	Chapter1	Optical Microscope: Focusing of Electron Beams	Theoretical	General questions +Exam
15	**2 hours**	Chapter13	Classifications of Hardness Test: Microhardness (Nano-Hardness), Microhardness Test.	Theoretical	General questions +Exam
16	**2 hours**	Chapter14	**Final Exam**	Theoretical	

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)	Prof. Dr. Krishan Lal President, Indian National Science Academy Published by Tata McGraw-Hill Publishing New Delhi 110 008. Copyright © 2011,
Main references (sources)	S.L.Kakani, February 2004 Amit Kakani ,
Recommended books and references (scientific journals, reports…)	none
Electronic References, Websites	Wikipedia

Course Description Form

1. Course Name:
Scientific Research Methodology
2. Course Code:
UOB 3635
3. Semester / Year:
Second semester / Third Stage
4. Description Preparation Date:
2024-4-2
5. Available Attendance Forms:
Weekly
6. Number of Credit Hours (Total) / Number of Units (Total)
30 hours
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Ali A. Alzubadi Email: ali.kareem@sc.uobaghdad.edu.iq
8. Course Objectives

Course Objectives	Teaching students the basic principles of physics. 2. Preparing specialists in the field of general physics and its practical applications, which bears the responsibility of studying the country's need for development and progress and capable of meeting the needs of the job market in state institutions and industry sectors. 3. Preparing an educated generation armed with science and adopts it as a sound basis to bring about radical changes and assign scientific knowledge and scientific methods in thinking, analysis and adaptation with the development of technologies, to keep up with the expansion of human needs. 4. Effective contribution for deepening and documenting the connection of the university with the society through the implementation of advisory counseling, training and development of teaching and administrative staff. 5. The service of preparing graduates specialized in physics who contribute to development in the country. 6. Meeting the needs of various sectors with highly qualified personals in the field of physics. 7. Encouraging the distinguished in this field to work as teaching assistants in the department to be part of the academic teaching staff in the future.

9. Teaching and Learning Strategies

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

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	**2 hours**	Chapter1	1. **Research Methodology**: (a) A review of the Fundamentals (b) Definitions of Research Objectives of Research	Theoretical	General questions +Exam
2	**2 hours**	Chapter2	(a) Motivation in Research (b) General Characteristics of Research Types of Research	Theoretical	General questions +Exam
3	**2 hours**	Chapter3	**2. The Research Problem** (a) What is a Research Problem Selecting the Problem	Theoretical	General questions +Exam
4	**2 hours**	Chapter4	(a) Sources of the Problem (b) Statement of a Problem Evaluation of a Problem	Theoretical	General questions +Exam
5	**2 hours**	Chapter5	**3. The Review of Literature** (a) Meaning of Review of Literature Objectives of Review of Literature	Theoretical	General questions +Exam
6	**2 hours**	Chapter6	(a) Sources of Literature Reporting the Review of Literature	Theoretical	General questions +Exam
7	**2 hours**		**exam**	Theoretical	Exam
8	**2 hours**	Chapter7	4. The Research Approach **(a)** The Qualitative Approach The Quantitative Approach	Theoretical	General questions +Exam
9	**2 hours**	Chapter8	(a) The Mixed-Methods Approach	Theoretical	General questions +Exam

			Criteria for Selecting a Research Approach		
10	**2 hours**	Chapter9	**5. Data Collection Methods** (a) Questionnaires Interviews	Theoretical	General questions +Exam
11	**2 hours**	Chapter10	(a) Focus Groups Observation	Theoretical	General questions +Exam
12	**2 hours**	Chapter11	**1. Sampling** Meaning and Definition of Sampling	Theoretical	General questions +Exam
13	**2 hours**	Chapter12	(a) Functions of Population and Sampling Methods of Sampling	Theoretical	General questions +Exam
14	**2 hours**	Chapter1	**1. Preparation of the Research** Characteristics of a Good Research Title	Theoretical	General questions +Exam
15	**2 hours**	Chapter13	(a) Structure of research paper: (1) Abstract (2) Introductions (3) Review of the literature (4) Methodology (5) Result & Discussions (6) Conclusions	Theoretical	General questions +Exam
16	**2 hours**		**Final exam**	Theoretical	

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)	Research Methodology by Ashish Kumar Sharma (2020)
Main references (sources)	Scientific Research Methodology by Alejandro Drewes (2021)
Recommended books and references (scientific journals, reports…)	none
Electronic References, Websites	Wikipedia

Course Description Form

1. Course Name:
Laser physics (1)
2. Course Code:
PHY 3636
3. Semester / Year:
Second semester / Third Stage
4. Description Preparation Date:
2024-4-2
5. Available Attendance Forms:
Weekly
6. Number of Credit Hours (Total) / Number of Units (Total)
30 hours
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Nathera Abass Ali Dr.Sarmed Salih mehdi Khudhaier Al-Awadi Dr. Eman.K.Hasan Dr. Hadeel A. Email: Nathera.Ali@sc.uobaghdad.edu.iq sarmed.alawadi@sc.uobaghdad.edu.iq eman.hasan@sc.uobaghdad.edu.iq hadeel.o@sc.uobaghdad.edu.iq
8. Course Objectives

Course Objectives	Teaching students the basic principles of physics. 2. Preparing specialists in the field of general physics and its practical applications, which bears the responsibility of studying the country's need for development and progress and capable of meeting the needs of the job market in state institutions and industry sectors. 3. Preparing an educated generation armed with science and adopts it as a sound basis to bring about radical changes and assign scientific knowledge and scientific methods in thinking, analysis and adaptation with the development of technologies, to keep up with the expansion of human needs. 4. Effective contribution for deepening and documenting the connection of the university with the society through the implementation of advisory counseling, training and development of teaching and administrative staff. 5. The service of preparing graduates specialized in physics who contribute to development in the country. 6. Meeting the needs of various sectors with highly qualified personals in the field of physics. 7. Encouraging the distinguished in this field to work as teaching assistants in the department to be part of the academic teaching staff in the future.

9. Teaching and Learning Strategies

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

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2 hours		Introductory concepts; Electromagnetic Radiation; The development of the atomic model; Brief history of laser; Fundamental of Light-Matter Interaction; Absorption, spontaneous and Simulated Emission and its rate equations with examples	Theoretical	1
2	2 hours		The Laser Idea; Pumping Schemes; Three Level Laser; Four Level Laser; Advantages of four level lasers Compared to three level lasers with examples	Theoretical	2
3	2 hours		Properties of Laser Beam; Monochromaticity; Coherence; Directionality; Brightness; Optical Resonator; Definition; passive optical resonators ; Standing waves with examples	Theoretical	3
4	2 hours		Resonator Configurations (types); Plan- Parallel resonator(Fabry-	Theoretical	4

			Perot)advantage & disadvantage; Concentric (Spherical) resonator advantage & disadvantage; Confocal resonator advantage & disadvantage; Resonators using a combination of plane & spherical mirrors; Stable Resonator with examples		
5	**2 hours**		Unstable Resonator; plane- parallel resonator; Modes and Spot Size Calculations; TEM00 Modes; TEM01 Modes; TEM11 Modes; Generalized Spherical Resonator; The stability condition of the resonator with examples	Theoretical	5
6	**2 hours**		The stability condition of (1) Plane-Parallel resonator (2) Concentric Resonator (3) Confocal Resonator; schematic diagram of stability condition with examples	Theoretical	6
7	**2 hours**		**Exam**	Theoretical	7
8	**2 hours**		Pumping process; Definition; Optical pumping; Electrical pumping; Chemical pumping; Gas-dynamic pumping; Optical pumping; pulsed laser; continuous wave; the type of lamps.;	Theoretical	8

9	**2 hours**		types of pumping efficiency; Transfer efficiency; Lamp radiative efficiency; Pump quantum efficiency; Pump light distribution; Pumping rate	Theoretical	9
10	**2 hours**		ELECTRICAL PUMPING; Electron Impact Excitation; Pump Rate and Pump Efficiency; Excitation by (Near) resonant Energy Transfer; Chemical pumping	Theoretical	10
11	**2 hours**		Introduction; Types of Laser according to active media & the pumping methods; solid state laser:- Ruby laser; Nd-YAG laser.	Theoretical	11
12	**2 hours**		Gas laser : Atomic laser, He-Ne laser; Molecular laser, CO_2 laser	Theoretical	12
13	**2 hours**		Dye laser; photo physical process	Theoretical	13
14	**2 hours**		Laser in medicine; Introduction; Application in Biology and Medicine; Photo-medicine and Photobiology; Laser Induced Biological Damage; Laser Induced Eyes Damage; General Structure of the Eye; Light sensitive tissues.	Theoretical	14
15	**2 hours**		Eye diseases; Myopia (short-sightedness); Treatment Myopia with laser; Hyperopia (long-sightedness); Treatment Hyperopia	Theoretical	

			with laser; Spectral Bands; Tissue Interactions and Biological Effects; Interaction mechanisms between the laser radiation and biological tissue		

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)	Principles of Lasers ,O.Svelto, 2nd Edition , Plenum Press . New York and London , 1998.
Main references (sources)	None
Recommended books and references (scientific journals, reports…)	None
Electronic References, Websites	Wikipedia

Course Description Form

1. Course Name:
Renewable energy (elective)
2. Course Code:
PHY 3637-1
3. Semester / Year:
Second semester / Third Stage
4. Description Preparation Date:
2024-4-2
5. Available Attendance Forms:
Weekly
6. Number of Credit Hours (Total) / Number of Units (Total)
30 hours
7. Course administrator's name (mention all, if more than one name)
Name Dr. Falah A-H. Mutlak Email: Falah.mutlak@sc.uobaghd.edu.iq
8. Course Objectives

Course Objectives	Teaching students the basic principles of physics. 2. Preparing specialists in the field of general physics and its practical applications, which bears the responsibility of studying the country's need for development and progress and capable of meeting the needs of the job market in state institutions and industry sectors. 3. Preparing an educated generation armed with science and adopts it as a sound basis to bring about radical changes and assign scientific knowledge and scientific methods in thinking, analysis and adaptation with the development of technologies, to keep up with the expansion of human needs. 4. Effective contribution for deepening and documenting the connection of the university with the society through the implementation of advisory counseling, training and development of teaching and administrative staff. 5. The service of preparing graduates specialized in physics who contribute to development in the country. 6. Meeting the needs of various sectors with highly qualified personals in the field of physics. 7. Encouraging the distinguished in this field to work as teaching assistants in the department to be part of the academic teaching staff in the future.

9. Teaching and Learning Strategies

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

10. Course Structure					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**

1	**2 hours**		**Introduction to Solar Energy;** Historical Perspective; Energy Use in the Iraq; Solar Energy; Obstacles and Outlook.	Theoretical	General questions +Exam
2	**2 hours**		**Fundamentals of Solar Radiation;** The Nature of Solar Radiation; **Radiation on Earth's Surface; Solar and Local Standard Time**	Theoretical	General questions +Exam
3	**2 hours**		**Measurement of Insolation;** Solar geometry; Radiation on Tilted Surfaces; Absorption, Transmission, Reflection	Theoretical	General questions +Exam
4	**2 hours**		**Collectors of Solar Radiation;** Types of Solar Collectors; Flat Plate Collectors	Theoretical	General questions +Exam
5	**2 hours**		**Thermal Analysis of Flat Plate Collectors -** Absorber Plate	Theoretical	General questions +Exam
6	**2 hours**		Cover Plate - Enclosure / Insulation	Theoretical	General questions +Exam
7	**2 hours**		**Exam**	Theoretical	Exam
8	**2 hours**		**Thermal Analysis of evacuated tube Collectors -** Absorber Plate - Cover Plate - Enclosure / Insulation	Theoretical	General questions +Exam
9	**2 hours**		**Concentrating Collectors;** Parabolic Dish and Trough Concentrators; Central Receiver Collector - Power Tower.	Theoretical	General questions +Exam
10	**2 hours**		**Review of Basic Heat Transfer Principles;** Conduction; Radiation; Convection; Combined Heat Transfer Mechanisms	Theoretical	General questions +Exam
11	**2 hours**		**Transfer and Storage of Heat;** Types of Transfer Fluids; Water and Water/Glycol Mixtures; Hydrocarbon Oils; Silicone Liquids	Theoretical	General questions +Exam
12	**2 hours**		**Types of Thermal Energy Storage;** Sensible Heat Storage; Water Heat Storage;	Theoretical	General questions +Exam

			Rock Bed Storage, Latent Heat Storage.		
13	**2 hours**		**Design of Storage System;** Selection of Storage Material; Design of Containment Sizing of Storage System and Temperature Stratification.	Theoretical	General questions +Exam
14	**2 hours**		**Types of solar energy concentrators;** Review of concentrated Solar Power CSP) and Concentrated Photovoltaic (CPV) systems; Fresnel lenses and Fresnel reflectors; operating solar cells at high incident energy for maximum power output.	Theoretical	General questions +Exam
15	**2 hours**		**Tracking requirements;** examples	Theoretical	General questions +Exam
16	**2 hours**			**Final Exam**	

11. Course Evaluation

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

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Advanced Technologies for Solar Photovoltaics Energy Systems (Green Energy and Technology) by Saad Motahhir (Editor), Ali M. Eltamaly
Main references (sources)	none
Recommended books and references (scientific journals, reports…)	none
Electronic References, Websites	Wikipedia

Course Description Form

1. Course Name:
Renewable energy (elective)
2. Course Code:
PHY 3637-1
3. Semester / Year:
Second semester / Third Stage
4. Description Preparation Date:
2024-4-2
5. Available Attendance Forms:
Weekly
6. Number of Credit Hours (Total) / Number of Units (Total)
30 hours
7. Course administrator's name (mention all, if more than one name)
Name Dr. Falah A-H. Mutlak Email: Falah.mutlak@sc.uobaghd.edu.iq
8. Course Objectives

Course Objectives	Teaching students the basic principles of physics. 2. Preparing specialists in the field of general physics and its practical applications, which bears the responsibility of studying the country's need for development and progress and capable of meeting the needs of the job market in state institutions and industry sectors. 3. Preparing an educated generation armed with science and adopts it as a sound basis to bring about radical changes and assign scientific knowledge and scientific methods in thinking, analysis and adaptation with the development of technologies, to keep up with the expansion of human needs. 4. Effective contribution for deepening and documenting the connection of the university with the society through the implementation of advisory counseling, training and development of teaching and administrative staff. 5. The service of preparing graduates specialized in physics who contribute to development in the country. 6. Meeting the needs of various sectors with highly qualified personals in the field of physics. 7. Encouraging the distinguished in this field to work as teaching assistants in the department to be part of the academic teaching staff in the future.

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

10. Course Structure

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

1	**2 hours**		**Introduction to Solar Energy;** Historical Perspective; Energy Use in the Iraq; Solar Energy; Obstacles and Outlook.	Theoretical	General questions +Exam
2	**2 hours**		**Fundamentals of Solar Radiation;** The Nature of Solar Radiation; **Radiation on Earth's Surface; Solar and Local Standard Time**	Theoretical	General questions +Exam
3	**2 hours**		**Measurement of Insolation;** Solar geometry; Radiation on Tilted Surfaces; Absorption, Transmission, Reflection	Theoretical	General questions +Exam
4	**2 hours**		**Collectors of Solar Radiation;** Types of Solar Collectors; Flat Plate Collectors	Theoretical	General questions +Exam
5	**2 hours**		**Thermal Analysis of Flat Plate Collectors -** Absorber Plate	Theoretical	General questions +Exam
6	**2 hours**		Cover Plate - Enclosure / Insulation	Theoretical	General questions +Exam
7	**2 hours**		**Midterm Exam**	Theoretical	Exam
8	**2 hours**		**Thermal Analysis of evacuated tube Collectors -** Absorber Plate - Cover Plate - Enclosure / Insulation	Theoretical	General questions +Exam
9	**2 hours**		**Concentrating Collectors;** Parabolic Dish and Trough Concentrators; Central Receiver Collector - Power Tower.	Theoretical	General questions +Exam
10	**2 hours**		**Review of Basic Heat Transfer Principles;** Conduction; Radiation; Convection; Combined Heat Transfer Mechanisms	Theoretical	General questions +Exam
11	**2 hours**		**Transfer and Storage of Heat;** Types of Transfer Fluids; Water and Water/Glycol Mixtures; Hydrocarbon Oils; Silicone Liquids	Theoretical	General questions +Exam
12	**2 hours**		**Types of Thermal Energy Storage;** Sensible Heat Storage; Water Heat Storage;	Theoretical	General questions +Exam

			Rock Bed Storage, Latent Heat Storage.		
13	**2 hours**		**Design of Storage System;** Selection of Storage Material; Design of Containment Sizing of Storage System and Temperature Stratification.	Theoretical	General questions +Exam
14	**2 hours**		**Types of solar energy concentrators;** Review of concentrated Solar Power CSP) and Concentrated Photovoltaic (CPV) systems; Fresnel lenses and Fresnel reflectors; operating solar cells at high incident energy for maximum power output.	Theoretical	General questions +Exam
15	**2 hours**		**Tracking requirements;** examples	Theoretical	General questions +Exam
16	**2 hours**			**Final Exam**	

11. Course Evaluation

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

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Advanced Technologies for Solar Photovoltaics Energy Systems (Green Energy and Technology) by Saad Motahhir (Editor), Ali M. Eltamaly
Main references (sources)	none
Recommended books and references (scientific journals, reports…)	none
Electronic References, Websites	Wikipedia

Course Description Form

1. Course Name:
Optical fibers (elective)
2. Course Code:
PHY 3637-2
3. Semester / Year:
Second semester / Third Stage
4. Description Preparation Date:
2024-4-2
5. Available Attendance Forms:
Weekly
6. Number of Credit Hours (Total) / Number of Units (Total)
30 hours
7. Course administrator's name (mention all, if more than one name)
Name Dr. Soudad S.ahmed Email: Soudad.ahmed@sc.uobaghdad.edu.iq
8. Course Objectives

Course Objectives	Teaching students the basic principles of physics. 2. Preparing specialists in the field of general physics and its practical applications, which bears the responsibility of studying the country's need for development and progress and capable of meeting the needs of the job market in state institutions and industry sectors. 3. Preparing an educated generation armed with science and adopts it as a sound basis to bring about radical changes and assign scientific knowledge and scientific methods in thinking, analysis and adaptation with the development of technologies, to keep up with the expansion of human needs. 4. Effective contribution for deepening and documenting the connection of the university with the society through the implementation of advisory counseling, training and development of teaching and administrative staff. 5. The service of preparing graduates specialized in physics who contribute to development in the country. 6. Meeting the needs of various sectors with highly qualified personals in the field of physics. 7. Encouraging the distinguished in this field to work as teaching assistants in the department to be part of the academic teaching staff in the future.

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

10. Course Structure

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

1	**2 hours**		Overview of optical fiber communications	Theoretical	General questions +Exam
2	**2 hours**		Optical fibers, struct5ures, waveguiding, and fabrication.	Theoretical	General questions +Exam
3	**2 hours**		Signal degradation in optical fibers.	Theoretical	General questions +Exam
4	**2 hours**		Optical sources.	Theoretical	General questions +Exam
5	**2 hours**		Power launching and coupling.	Theoretical	General questions +Exam
6	**2 hours**		Photodetectors.	Theoretical	General questions +Exam
7	**2 hours**		**Exam.**	Theoretical	Exam
8	**2 hours**		Optical receiver operation.	Theoretical	General questions +Exam
9	**2 hours**		Digital transmission system	Theoretical	General questions +Exam
10	**2 hours**		Analog system	Theoretical	General questions +Exam
11	**2 hours**		WDM concepts and components.	Theoretical	General questions +Exam
12	**2 hours**		Optical amplifier, Optical networks	Theoretical	General questions +Exam
13	**2 hours**		FBG structure and components, manufacturing.	Theoretical	General questions +Exam
14	**2 hours**		Optical fiber system analysis,	Theoretical	General questions +Exam
15	**2 hours**		Overview of optical fiber communications	Theoretical	General questions +Exam
16	**2 hours**			**Final Exam**	
11. Course Evaluation					

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

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Optical fiber communication essentials By Gerd Keiser
Main references (sources)	none
Recommended books and references (scientific journals, reports…)	none
Electronic References, Websites	International university courses in the field of optical communications

Course Description Form

1. Course Name:
Optical fibers (elective)
2. Course Code:
PHY 3637-2
3. Semester / Year:
Second semester / Third Stage
4. Description Preparation Date:
2024-4-2
5. Available Attendance Forms:
Weekly
6. Number of Credit Hours (Total) / Number of Units (Total)
30 hours
7. Course administrator's name (mention all, if more than one name)
Name Dr. Soudad S.ahmed Email: Soudad.ahmed@sc.uobaghdad.edu.iq
8. Course Objectives

Course Objectives	Teaching students the basic principles of physics. 2. Preparing specialists in the field of general physics and its practical applications, which bears the responsibility of studying the country's need for development and progress and capable of meeting the needs of the job market in state institutions and industry sectors. 3. Preparing an educated generation armed with science and adopts it as a sound basis to bring about radical changes and assign scientific knowledge and scientific methods in thinking, analysis and adaptation with the development of technologies, to keep up with the expansion of human needs. 4. Effective contribution for deepening and documenting the connection of the university with the society through the implementation of advisory counseling, training and development of teaching and administrative staff. 5. The service of preparing graduates specialized in physics who contribute to development in the country. 6. Meeting the needs of various sectors with highly qualified personals in the field of physics. 7. Encouraging the distinguished in this field to work as teaching assistants in the department to be part of the academic teaching staff in the future.

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

10. Course Structure

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

1	**2 hours**		Overview of optical fiber communications	Theoretical	General questions +Exam
2	**2 hours**		Optical fibers, struct5ures, waveguiding, and fabrication.	Theoretical	General questions +Exam
3	**2 hours**		Signal degradation in optical fibers.	Theoretical	General questions +Exam
4	**2 hours**		Optical sources.	Theoretical	General questions +Exam
5	**2 hours**		Power launching and coupling.	Theoretical	General questions +Exam
6	**2 hours**		Photodetectors.	Theoretical	General questions +Exam
7	**2 hours**		**Exam.**	Theoretical	Exam
8	**2 hours**		Optical receiver operation.	Theoretical	General questions +Exam
9	**2 hours**		Digital transmission system	Theoretical	General questions +Exam
10	**2 hours**		Analog system	Theoretical	General questions +Exam
11	**2 hours**		WDM concepts and components.	Theoretical	General questions +Exam
12	**2 hours**		Optical amplifier, Optical networks	Theoretical	General questions +Exam
13	**2 hours**		FBG structure and components, manufacturing.	Theoretical	General questions +Exam
14	**2 hours**		Optical fiber system analysis,	Theoretical	General questions +Exam
15	**2 hours**		Overview of optical fiber communications	Theoretical	General questions +Exam
16	**2 hours**			**Final Exam**	
11. Course Evaluation					

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

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Optical fiber communication essentials By Gerd Keiser
Main references (sources)	none
Recommended books and references (scientific journals, reports…)	none
Electronic References, Websites	International university courses in the field of optical communications

Course Description Form

1. Course Name:
Radiation Physics (elective)
2. Course Code:
PHY 3637-3
3. Semester / Year:
Second semester / Third Stage
4. Description Preparation Date:
2024-4-2
5. Available Attendance Forms:
Weekly
6. Number of Credit Hours (Total) / Number of Units (Total)
30 hours
7. Course administrator's name (mention all, if more than one name)
Name Dr. Asia H. Al-Mashhadani Email: asia.hammad@sci.uobaghdad.edu.iq
8. Course Objectives

Course Objectives	Teaching students the basic principles of physics. 2. Preparing specialists in the field of general physics and its practical applications, which bears the responsibility of studying the country's need for development and progress and capable of meeting the needs of the job market in state institutions and industry sectors. 3. Preparing an educated generation armed with science and adopts it as a sound basis to bring about radical changes and assign scientific knowledge and scientific methods in thinking, analysis and adaptation with the development of technologies, to keep up with the expansion of human needs. 4. Effective contribution for deepening and documenting the connection of the university with the society through the implementation of advisory counseling, training and development of teaching and administrative staff. 5. The service of preparing graduates specialized in physics who contribute to development in the country. 6. Meeting the needs of various sectors with highly qualified personals in the field of physics. 7. Encouraging the distinguished in this field to work as teaching assistants in the department to be part of the academic teaching staff in the future.

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

10. Course Structure

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

1	**2 hours**		Introduction to Radiation Physics Historical overview of radiation physics	Theoretical	General questions +Exam
2	**2 hours**		Types of radiation: ionizing and non-ionizing	Theoretical	General questions +Exam
3	**2 hours**		Fundamental properties of radiation	Theoretical	General questions +Exam
4	**2 hours**		Atomic and Nuclear Structure	Theoretical	General questions +Exam
5	**2 hours**		• Atomic structure and energy levels Nuclear structure and stability	Theoretical	General questions +Exam
6	**2 hours**		• Radioactive decay and decay modes Alpha decay	Theoretical	General questions +Exam
7	**2 hours**		**Exam**	Theoretical	Exam
8	**2 hours**		Beta and gamma decay	Theoretical	General questions +Exam
9	**2 hours**		Interaction of Radiation with Matter Charged particle interaction: (Maximum Energy Transfer in a Single Collision	Theoretical	General questions +Exam
10	**2 hours**		Interaction of Radiation with Matter beta	Theoretical	General questions +Exam
11	**2 hours**		Interaction of electrons with matter	Theoretical	General questions +Exam
12	**2 hours**		Interaction of neutrons with matter (Elastic scattering, Inelastic scattering)	Theoretical	General questions +Exam
13	**2 hours**		Interaction of gamma radiation with matter (Photoelectric effect, Compton scattering, pair production)	Theoretical	General questions +Exam
14	**2 hours**		Attenuation of gamma rays	Theoretical	General questions +Exam

15	**2 hours**		Radiation Units and Dosimetry	Theoretical	General questions +Exam
16	**2 hours**			**Final Exam**	

11. Course Evaluation

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

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	*James E. Turner* **Atoms, Radiation, and Radiation Protection**.
Main references (sources)	Nuclear Physics Concepts, By Meyerhof.
Recommended books and references (scientific journals, reports…)	none
Electronic References, Websites	Lecture Notes of radiation physics

Course Description Form

1. Course Name:
Detectors Physics (elective)
2. Course Code:
PHY 3637-4
3. Semester / Year:
Second semester / Third Stage
4. Description Preparation Date:
2024-4-2
5. Available Attendance Forms:
Weekly
6. Number of Credit Hours (Total) / Number of Units (Total)
30 hours
7. Course administrator's name (mention all, if more than one name)
Name Dr. Eman M. Nasir Email: Eman.nasir@sc.uobaghdad.edu.iq
8. Course Objectives

Course Objectives	Teaching students the basic principles of physics. 2. Preparing specialists in the field of general physics and its practical applications, which bears the responsibility of studying the country's need for development and progress and capable of meeting the needs of the job market in state institutions and industry sectors. 3. Preparing an educated generation armed with science and adopts it as a sound basis to bring about radical changes and assign scientific knowledge and scientific methods in thinking, analysis and adaptation with the development of technologies, to keep up with the expansion of human needs. 4. Effective contribution for deepening and documenting the connection of the university with the society through the implementation of advisory counseling, training and development of teaching and administrative staff. 5. The service of preparing graduates specialized in physics who contribute to development in the country. 6. Meeting the needs of various sectors with highly qualified personals in the field of physics. 7. Encouraging the distinguished in this field to work as teaching assistants in the department to be part of the academic teaching staff in the future.

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

10. Course Structure

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

1	**2 hours**		General Introduction , Classification of detectors, semiconductor detectors	Theoretical	General questions +Exam
2	**2 hours**		Photoconductive detectors, types, Detectors parameters, Figures of merits	Theoretical	General questions +Exam
3	**2 hours**		Photovoltaic detectors, types, Detectors parameters, Figures of merits	Theoretical	General questions +Exam
4	**2 hours**		Photodiode detectors, Photodiode characteristics, Structure and working circuits of a photodiode detectors, Figures of merits	Theoretical	General questions +Exam
5	**2 hours**		Phototransistor detectors, characteristic, properties, application	Theoretical	General questions +Exam
6	**2 hours**		Photoresistor detectors, characteristic, properties, application	Theoretical	General questions +Exam
7	**2 hours**		**Exam**	Theoretical	Exam
8	**2 hours**		Solar cell efficiency, Difference between detectors and solar cell I-V characteristics of photoconductive detector and photovoltaic detectors	Theoretical	General questions +Exam
9	**2 hours**		Thermal detectors , classification and	Theoretical	General questions +Exam

			properties, Figures of merits		
10	**2 hours**		Thermocouples detectors, characteristic, properties, application, Thermopiles detectors, characteristic, properties, application	Theoretical	General questions +Exam
11	**2 hours**		Pyroelectric detectors, Bolometers detectors, characteristic, properties, application	Theoretical	General questions +Exam
12	**2 hours**		Metalic and thermoistor Bolometers detectors, semiconductor and micromachined bolometer detectors, Superconducting Bolometer detectors	Theoretical	General questions +Exam
13	**2 hours**		Charged Particle Detectors, Scintillators Detectors, Gas Detectors 1. Ionization Chambers 2. Proportional Counters 3. Avalanche detectors 4. Geiger-Muller counters 5. Spark detectors	Theoretical	General questions +Exam
14	**2 hours**		Solid State Detectors, Gamma ray detection (Scintillators, Solid State dets.) Neutron detection.	Theoretical	General questions +Exam
15	**2 hours**		Gas Sensors, types, materials, characteristics, parameters sensors, Properties of thermal detectors, Properties of gas sensors.	Theoretical	General questions +Exam
16	**2 hours**			**Final Exam**	
11. Course Evaluation					

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

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Measurement and detection of radiation,4th edition, Nicholas Tsoulfanidis,2015
Main references (sources)	Compound semiconductor radiation detector, Alan owens,2016
Recommended books and references (scientific journals, reports…)	none
Electronic References, Websites	https://www.semiconductor.org/semiconductor-sensors

Course Description Form

1. Course Name:
Biomaterials (elective)
2. Course Code:
PHY 3637-5
3. Semester / Year:
Second semester / Third Stage
4. Description Preparation Date:
2024-4-2
5. Available Attendance Forms:
Weekly
6. Number of Credit Hours (Total) / Number of Units (Total)
30 hours
7. Course administrator's name (mention all, if more than one name)
Name Dr. Seenaa Ibraheim Hussein Email: seenaa.hussein@sc.uobaghdad.edu.iq
8. Course Objectives

Course Objectives	Teaching students the basic principles of physics. 2. Preparing specialists in the field of general physics and its practical applications, which bears the responsibility of studying the country's need for development and progress and capable of meeting the needs of the job market in state institutions and industry sectors. 3. Preparing an educated generation armed with science and adopts it as a sound basis to bring about radical changes and assign scientific knowledge and scientific methods in thinking, analysis and adaptation with the development of technologies, to keep up with the expansion of human needs. 4. Effective contribution for deepening and documenting the connection of the university with the society through the implementation of advisory counseling, training and development of teaching and administrative staff. 5. The service of preparing graduates specialized in physics who contribute to development in the country. 6. Meeting the needs of various sectors with highly qualified personals in the field of physics. 7. Encouraging the distinguished in this field to work as teaching assistants in the department to be part of the academic teaching staff in the future.

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

10. Course Structure

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

1	**2 hours**		Fundamentals of biomaterials science. Concept of biocompatibility. Classes of biomaterials used in medicine, basic properties, medical requirements and clinical significance. Desinfection and sterilization of biomaterials.	Theoretical	General questions +Exam
2	**2 hours**		Physico-chemical properties of biomaterials: mechanical (elasticity, yield stress, ductility, toughness, strength, fatigue, hardness, wear resistance), tribological (friction, wear, lubricity), morphology and texture, physical (electrical, optical, magnetic, thermal).	Theoretical	General questions +Exam
3	**2 hours**		Chemical and biological properties: solubility and erosion, , corrosion , Biological properties and Biological soft tissue materials	Theoretical	General questions +Exam
4	**2 hours**		Elements in contact with the surface of a biomaterial: blood composition, plasma proteins, cells, tissues.	Theoretical	General questions +Exam
5	**2 hours**		Phenomena at the biointerfaces. Molecular and cellular processes with living environment, blood-materials interaction, short and long term reactions to the body	Theoretical	General questions +Exam
6	**2 hours**		Testing of biomaterials: *in vitro*, *in vivo* preclinical and *in vivo* clinical tests.	Theoretical	General questions +Exam
7	**2 hours**		**Exam**	Theoretical	Exam
8	**2 hours**		Technologies of biomaterials processing, as implants and medical devices; improvement of materials	Theoretical	General questions +Exam

			biocompatibility by plasma processing.		
9	**2 hours**		Metal -Based biomaterials, Polymer -based biomaterials , Ceramic -based biomaterials	Theoretical	General questions +Exam
10	**2 hours**		Applications of biomaterials , Applications in dentistry , Applications in oral and maxillofacial surgery, Applications in tissue engineering	Theoretical	General questions +Exam
11	**2 hours**		Composites biomaterials , Reinforced of matrix , Based on the type of matrix material , Types of fibers , Fabrication Processes of Fibrous bioComposites, Factors influencing the performance of bio composites	Theoretical	General questions +Exam
12	**2 hours**		Synthetic biomaterials , Addition , Condensation , Polymerization	Theoretical	General questions +Exam
13	**2 hours**		Characteristics of biomaterials , toxicology, biocompatible , biodegradation, Classification and medical application of biomaterials	Theoretical	General questions +Exam
14	**2 hours**		Biomaterials and Sol–Gel Process: A Methodology for the Preparation of Functional Materials	Theoretical	General questions +Exam
15	**2 hours**		Antibacterial Performance of Graded Nano–Composite Biomaterials	Theoretical	General questions +Exam
16	**2 hours**			**Final Exam**	

11. Course Evaluation

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

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	• H.Boenig, *Fundamentals of Plasma Chemistry and Tehnology*, Technomic Publishing Co.Inc. Lancaster Basel, 1990.
Main references (sources)	• *Practical Surface Analysis*, 2- edition, Edited by D.Briggs, M.P.Seah, J.Wiley & Sons Ltd, 1990. • *Biomaterials Science, An Intoduction to Materials in medicine,* Eds. B. D. Ratner and A. S. Hoffman, Academic Press, New York, 1996. • *Plasma-surface modification of biomaterials*, P.K.Chua, J.Y.Chena, L.P.Wanga, N.Huang, Elsevier Science B.V, 2002. • XXX – Articles about *Biomaterials and Biocompatibility*
Recommended books and references (scientific journals, reports…)	none
Electronic References, Websites	Wikipedia

Course Description Form

1. Course Name:
Electrical Discharges Physics (elective)
2. Course Code:
PHY 3637-6
3. Semester / Year:
Second semester / Third Stage
4. Description Preparation Date:
2024-4-2
5. Available Attendance Forms:
Weekly
6. Number of Credit Hours (Total) / Number of Units (Total)
30 hours
7. Course administrator's name (mention all, if more than one name)
Name Dr. Thamir H. Khalaf Email: Thamir.Khalaf@sc.uobaghdad.edu.iq
8. Course Objectives

Course Objectives	Teaching students the basic principles of physics. 2. Preparing specialists in the field of general physics and its practical applications, which bears the responsibility of studying the country's need for development and progress and capable of meeting the needs of the job market in state institutions and industry sectors. 3. Preparing an educated generation armed with science and adopts it as a sound basis to bring about radical changes and assign scientific knowledge and scientific methods in thinking, analysis and adaptation with the development of technologies, to keep up with the expansion of human needs. 4. Effective contribution for deepening and documenting the connection of the university with the society through the implementation of advisory counseling, training and development of teaching and administrative staff. 5. The service of preparing graduates specialized in physics who contribute to development in the country. 6. Meeting the needs of various sectors with highly qualified personals in the field of physics. 7. Encouraging the distinguished in this field to work as teaching assistants in the department to be part of the academic teaching staff in the future.

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

10. Course Structure

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

1	**2 hours**		Introduction: Definition and Content of Gas Discharge, History of Electrical Discharge Research, Classification of the Discharge, Applications of the Discharge.	Theoretical	General questions +Exam
2	**2 hours**		Fundamentals of Gas Discharge: Charged Particles in the Process of Gas Discharge, Photons, Electrons, Ground State Atoms (or Molecules) and Excited Atoms (or Molecules), Positive and Negative Ions.	Theoretical	General questions +Exam
3	**2 hours**		Movement of Charged Particles: Thermal Motion of Charged Particles, Diffusion Motion of Charged Particles, Drift Motion of Charged Particles.	Theoretical	General questions +Exam
4	**2 hours**		Collision Interactions of Charged Particles: Classification of Collision Between Particles, Collision Energy Transfer, Collision Characteristic Parameters, Elastic Collisions of Electrons, Ions and Atoms, Excitation and Ionization of Gas Atoms, Gas Particle Excitation Transferring, Disappearance of Charged Particles.	Theoretical	General questions +Exam
5	**2 hours**		Fundamental Theory of Townsend Discharge: Formation and Development of Electronic Avalanche, Formation of Electronic Avalanche, α Process, γ Process.	Theoretical	General questions +Exam
6	**2 hours**		Self-Sustaining Discharge Criterion, Gas Discharge Volt-Ampere Characteristics, From Non-Self-Sustaining to Self-Sustaining Discharge, The Condition of Self-Sustained Discharge.	Theoretical	General questions +Exam
7	**2 hours**		**Exam.**	Theoretical	Exam

8	**2 hours**		Paschen's Law: Paschen's curve, The Impact of Impurity Gases, on the Breakdown Potential, The Impact of Electrodes on Breakdown Voltage, The Impact of Electric Field Distribution on Breakdown Voltage, The Impact of External Ionization Source on Breakdown Potential.	Theoretical	General questions +Exam
9	**2 hours**		Townsend Discharge Experiments: The Steady-State Townsend Experiment (SST), Pulse Townsend Method (PT).	Theoretical	General questions +Exam
10	**2 hours**		Fundamental Theory of Streamer and Leader Discharge: Streamer Discharge Mechanism, Basic Properties of Spark Discharge, Streamer Discharge.	Theoretical	General questions +Exam
11	**2 hours**		Long Gap and Leader Discharge, Experimental Study on the Long Gap Discharge in Air, Discharge Process in Non-uniform Electric Field	Theoretical	General questions +Exam
12	**2 hours**		Theoretic Analysis Methods for Modeling Gas Discharge: Monte Carlo Simulation, Introduction of General Monte Carlo Simulation, Monte Carlo Simulation of Electron Avalanche Development, Electron Swarm Parameters from Monte Carlo Simulation.	Theoretical	General questions +Exam
13	**2 hours**		Breakdown Voltage Characteristics in Uniform and Quasi-Uniform Electric Fields, Breakdown Characteristics Under Continuous Voltages, Breakdown Characteristics Under Lightning Impulse Voltages, Breakdown Characteristics, Under Operating Impulse Voltage.	Theoretical	General questions +Exam

14	**2 hours**		Breakdown Characteristics in Extremely: Non-uniform Electric Fields, Breakdown Characteristics Under Continuous Voltage, Breakdown Characteristics, Under Lightning Impulse Voltage, Breakdown Voltage Under Operating Impulse Voltage	Theoretical	General questions +Exam
15	**2 hours**		Methods to Improve Insulation Strength in Air: Improve the Shape of Electrodes, Use of Electric Field Distortion by Space Charges, Use of Barrier in Extremely Non-uniform Electric Fields.	Theoretical	General questions +Exam
16	**2 hours**			**Final Exam**	

11. Course Evaluation

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

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	• 1- D. Xiao "Gas Discharge and Gas Insulation, Springer, 2016.
Main references (sources)	• Raizer YP, "Gas discharge physics", Springer, Berlin, 1991. • Zhancheng Wu, Xijun Zhang, Youzhi Hu Gas discharge. National Defence Industry Press, Beijing, 2012.
Recommended books and references (scientific journals, reports…)	none
Electronic References, Websites	Wikipedia

Course Description Form

1. Course Name:
Virtual Lab.
2. Course Code:
PPP 321
3. Semester / Year:
Second semester / Third Stage
4. Description Preparation Date:
2024-4-2
5. Available Attendance Forms:
Weekly
6. Number of Credit Hours (Total) / Number of Units (Total)
30 hours
7. Course administrator's name (mention all, if more than one name)
Name Dr.Manal M. Adulla Dr. Inaam M. abdulmajeed Dr saad hammed Dr.Qusai adnan Dr. falah abdul hassn Email: inaam.mohammed@ sc.uobaghdad.edu.iq manal.m@sc.uobaghdad.edu.iq saad.mohmmed@sc.uobaghdad.edu.iq
8. Course Objectives

Course Objectives	Teaching students the basic principles of physics. 2. Preparing specialists in the field of general physics and its practical applications, which bears the responsibility of studying the country's need for development and progress and capable of meeting the needs of the job market in state institutions and industry sectors. 3. Preparing an educated generation armed with science and adopts it as a sound basis to bring about radical changes and assign scientific knowledge and scientific methods in thinking, analysis and adaptation with the development of technologies, to keep up with the expansion of human needs. 4. Effective contribution for deepening and documenting the connection of the university with the society through the implementation of advisory counseling, training and development of teaching and administrative staff. 5. The service of preparing graduates specialized in physics who contribute to development in the country. 6. Meeting the needs of various sectors with highly qualified personals in the field of physics. 7. Encouraging the distinguished in this field to work as teaching assistants in the department to be part of the academic teaching staff in the future.

9. Teaching and Learning Strategies

Strategy	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive

	tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	**2 hours**		introduction	Experimental simulation	General questions +Exam
2	**2 hours**	**First experiment**	Gases law	Experimental simulation	General questions +Exam
3	**2 hours**	**second experiment**	Momentum and collision	Experimental simulation	General questions +Exam
4	**2 hours**	**Third experiment**	Project motion	Experimental simulation	General questions +Exam
5	**2 hours**	**Fourth experiment**	Capacitor lab.	Experimental simulation	General questions +Exam
6	**2 hours**	**Fifth experiment**	Geometric optics 1	Experimental simulation	General questions +Exam
7	**2 hours**		**Exam**	Experimental simulation	Exam
8	**2 hours**	**Sixth experiment**	Geometric optics 2	Experimental simulation	General questions +Exam
9	**2 hours**	**Seventh experiment**	Wave interference	Experimental simulation	General questions +Exam
10	**2 hours**	**Eighth experiment**	Wave on string	Experimental simulation	General questions +Exam
11	**2 hours**	**Ninth experiment**	Rutherford	Experimental simulation	General questions +Exam
12	**2 hours**		**Review experiment**		
13	**2 hours**		**Month exam**		
14	**2 hours**				

15	**2 hours**				
16	**2 hours**	**Final Exam**		**Final Exam**	

11. Course Evaluation

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

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Lab. book
Main references (sources)	Fundamental of physics,9 th edition 2011
Recommended books and references (scientific journals, reports…)	Any physics book and journal in library
Electronic References, Websites	Wikipedia, PhET simulation

Course Description Form

1. Course Name:
Nuclear Physics 1
2. Course Code:
PHYS 4738
3. Semester / Year:
First semester / Fourth stage
4. Description Preparation Date:
2024-4-2
5. Available Attendance Forms:
Weekly
6. Number of Credit Hours (Total) / Number of Units (Total)
30 hours
7. Course administrator's name (mention all, if more than one name)
Name: Prof. Dr. Asia H. Al-Mashhadani Email: asia.hammad@sci.uobaghdad.edu.iq
8. Course Objectives

Course Objectives	Teaching students the basic principles of physics. 2. Preparing specialists in the field of general physics and its practical applications, which bears the responsibility of studying the country's need for development and progress and capable of meeting the needs of the job market in state institutions and industry sectors. 3. Preparing an educated generation armed with science and adopts it as a sound basis to bring about radical changes and assign scientific knowledge and scientific methods in thinking, analysis and adaptation with the development of technologies, to keep up with the expansion of human needs. 4. Effective contribution for deepening and documenting the connection of the university with the society through the implementation of advisory counseling, training and development of teaching and administrative staff. 5. The service of preparing graduates specialized in physics who contribute to development in the country. 6. Meeting the needs of various sectors with highly qualified personals in the field of physics. 7. Encouraging the distinguished in this field to work as teaching assistants in the department to be part of the academic teaching staff in the future.

9. Teaching and Learning Strategies

Strategy	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive

	tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	**2 hours**	Chapter 1 Historical review (Development of atom)	Dalton's atom, Electron, Thomson's atom, Proton, Neutron, Penetration of alpha particle through thin gold foil	Theoretical	General questions +Exam
2	**2 hours**	=	Rutherford's atom, Failure of Thomson's atom, Failure of Rutherford's atom, Bohr's atom, Photon energy, What is Bohr's idea account for?	Theoretical	General questions +Exam
3	**2 hours**	Chapter 2 Properties of nuclei (Basic nuclear concepts)	Nuclear radii, Nuclear density, Nuclear size,	Theoretical	General questions +Exam
4	**2 hours**		Nomenclature (Nuclide, Isotopes, Isobars, Isomer, Nucleon, Mesons), Mass defect, Binding energy,	Theoretical	General questions +Exam
5	**2 hours**		Nuclear forces, Properties of nuclear forces, Nuclear separation energy, Chart of Nuclides and nuclear stability, Nuclear abundance	Theoretical	General questions +Exam
6	**2 hours**	Chapter3	Nuclear angular momentum, Nuclear Parity, Magnetic dipole moments,	Theoretical	General questions +Exam
7	**2 hours**		Electric quadrupole moments, Wave mechanical properties, Types of statistics: (Bose-Einstein statistics and Fermi – Dirac statistics)	Theoretical	Exam
8	**2 hours**		Monthly Exam in Chapters 1, 2 and 3	Theoretical	General questions +Exam
9	**2 hours**	Chapter 4 Quantum mechanical description of Nuclei	Schrodinger wave equation, Bound states in one dimensional systems, Particle in square well	Theoretical	General questions +Exam
10	**2 hours**		Bound states in three dimensions, Neutron-Proton	Theoretical	General questions +Exam

			system: Bound state of the deuteron, overview of cross section calculation.		
11	**2 hours**	Chapter 5 Interaction of Radiation with Matter	Charged particle interaction: (Maximum Energy Transfer in a Single Collision, Stopping Power, Range of a particle)	Theoretical	General questions +Exam
12	**2 hours**		Interaction of electrons with matter, Interaction of neutrons with matter (Elastic scattering, Inelastic scattering)	Theoretical	General questions +Exam
13	**2 hours**		Interaction of gamma radiation with matter (Photoelectric effect, Compton scattering, pair production)	Theoretical	General questions +Exam
14	**2 hours**		Attenuation of gamma rays Applications and solved problems	Theoretical	General questions +Exam
15	**2 hours**	Monthly Exam	Monthly Exam in chapters 4 and 5	Theoretical	General questions +Exam

11. Course Evaluation

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

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	References: 1. Nuclear Physics Concept, By Walter E. Meyerhof. 2. Introductory: Nuclear Physics, By Krane. 3. Lecture Notes of Massachusetts Institute of Technology.
Main references (sources)	
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

Course Description Form

13. Course Name:	
Solid State physics (1)	
14. Course Code:	
PHY4739	
15. Semester / Year:	
First semester / Fourth stage	
16. Description Preparation Date:	
2024-4-2	
17. Available Attendance Forms:	
Weekly	
18. Number of Credit Hours (Total) / Number of Units (Total)	
30 hours	
19. Course administrator's name (mention all, if more than one name)	
Name: Dr. Farah Tariq M. Noori Email:	
20. Course Objectives	
Course Objectives	Teaching students the basic principles of physics. 2. Preparing specialists in the field of general physics and its practical applications, which bears the responsibility of studying the country's need for development and progress and capable of meeting the needs of the job market in state institutions and industry sectors. 3. Preparing an educated generation armed with science and adopts it as a sound basis to bring about radical changes and assign scientific knowledge and scientific methods in thinking, analysis and adaptation with the development of technologies, to keep up with the expansion of human needs. 4. Effective contribution for deepening and documenting the connection of the university with the society through the implementation of advisory counseling, training and development of teaching and administrative staff. 5. The service of preparing graduates specialized in physics who contribute to development in the country. 6. Meeting the needs of various sectors with highly qualified personals in the field of physics. 7. Encouraging the distinguished in this field to work as teaching assistants in the department to be part of the academic teaching staff in the future.
21. Teaching and Learning Strategies	
Strategy	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students
22. Course Structure	

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	**2 hours**	Chapter1	1-Crystal structure: Basis, Lattice crystal translation vector and lattice- symmetry operations- two dimensional lattice type- three dimensional lattice type- Miller indices, the indices of a direction.	Theoretical	General questions +Exam
2	**2 hours**	Chapter2	Position in the cell - simple crystal structure (Sodium chloride structure, Cesium chloride structure- Close-packed structure- Diamond structure, Zinc Sulfide structure).	Theoretical	General questions +Exam
3	**2 hours**	Chapter3	2- Crystal diffraction and the reciprocal lattice: Bragg law- Experimental diffraction methods- Laue method- rotating crystal method	Theoretical	General questions +Exam
4	**2 hours**	Chapter4	powder method- reciprocal lattice- Brilloun zones- structure factor of the basis.	Theoretical	General questions +Exam
5	**2 hours**	Chapter5	3-Crystal Binding: crystal of Inert gases- Vander Waals- London interaction-equilibrium lattice constants- Cohesive energy- Repulsive interaction	Theoretical	General questions +Exam
6	**2 hours**	Chapter6	Compressibility and Bulk modulus- Ionic crystal- Madelung energy - Covalent crystal- Metal crystal- Hydrogen-bonded crystal- Atomic radii.	Theoretical	General questions +Exam
7	**2 hours**		**Exam**	Theoretical	Exam
8	**2 hours**	Chapter7	4- Phonons and Lattice vibrations: phonon Momentum- Inelastic scattering of photons by long wavelength phonons- Inelastic scattering of neutrons by phonons-Vibration of monoatomic lattices	Theoretical	General questions +Exam
9	**2 hours**	Chapter8	- group velocity- phase velocity- Vibrational modes of Lattice with two atoms per primitive	Theoretical	General questions +Exam

			cell- Local phonon modes.		
10	**2 hours**	Chapter9	5-Thermal properties of solids:Lattice heat capacity- Classical model for specific heat- Einstein model- Density of modes in one dimension- Density of modes in three dimensions	Theoretical	General questions +Exam
11	**2 hours**	Chapter10	Debye model of the lattice heat capacity, An harmonic crystal interactions- thermal expansion- thermal conductivity- Lattice thermal resistivity- Normal and Umklapp processes.	Theoretical	General questions +Exam
12	**2 hours**	Chapter11	6- Free electron model : classical free electron theory- Drude model- Lorentz model Thermal conductivity for free electron gas.	Theoretical	General questions +Exam
13	**2 hours**	Chapter12	7-Quantum free electron model: energy levels and density of state in one dimension	Theoretical	General questions +Exam
14	**2 hours**	Chapter1	free electron gas in three dimensions- density of state for free electron gas in three dimensions	Theoretical	General questions +Exam
15	**2 hours**	Chapter13	Sommerfeld's model for metallic conduction- electrical conductivity.	Theoretical	General questions +Exam
16	**2 hours**	Chapter14	**Final Exam**	Theoretical	

23. Course Evaluation

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

24. Learning and Teaching Resources

Required textbooks (curricular books, if any)	- Kittle , C., " Introduction to SolidState Physics" 8th ed., 2007 WileyWestern Limited, New York . 2- Omar, MA., " Elementary SolidState Physics"
Main references (sources)	None
Recommended books and references (scientific journals, reports…)	none
Electronic References, Websites	none

Course Description Form

1. Course Name:
Electromagnetic Theory (1)
2. Course Code:
PHY 4739
3. Semester / Year:
First semester / Fourth stage
4. Description Preparation Date:
2024-4-2
5. Available Attendance Forms:
Weekly
6. Number of Credit Hours (Total) / Number of Units (Total)
30 hours
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Thamir H. Khalaf Email: Thamir.Khalaf@sc.uobaghdad.edu.iq
8. Course Objectives

Course Objectives	Teaching students the basic principles of physics. 2. Preparing specialists in the field of general physics and its practical applications, which bears the responsibility of studying the country's need for development and progress and capable of meeting the needs of the job market in state institutions and industry sectors. 3. Preparing an educated generation armed with science and adopts it as a sound basis to bring about radical changes and assign scientific knowledge and scientific methods in thinking, analysis and adaptation with the development of technologies, to keep up with the expansion of human needs. 4. Effective contribution for deepening and documenting the connection of the university with the society through the implementation of advisory counseling, training and development of teaching and administrative staff. 5. The service of preparing graduates specialized in physics who contribute to development in the country. 6. Meeting the needs of various sectors with highly qualified personals in the field of physics. 7. Encouraging the distinguished in this field to work as teaching assistants in the department to be part of the academic teaching staff in the future.

9. Teaching and Learning Strategies

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

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	**2 hours**	Chapter1	Review of Basic Relevant Mathematics: Vector Algebra, Gradients Theorem, Divergences Theorem, Curls Theorem: (Stokes' theorem), Curvilinear Coordinates, Spherical Coordinates, Cylindrical Coordinates, and THE Dirac Delta Function.	Theoretical	General questions +Exam
2	**2 hours**	Chapter2	Static Electric and Magnetic Fields in Vacuum: Static Charges, The electrostatic Force, The Electric Field, Gauss' Law, and The Electric Potential**.**	Theoretical	General questions +Exam
3	**2 hours**	Chapter3	Moving Charges**,** The Continuity Equation, Magnetic Forces, The Law of Biot and Savart, Ampere's Law, The Magnetic Vector Potential, and The Magnetic Scalar Potential.	Theoretical	General questions +Exam
4	**2 hours**	Chapter4	Charge and Current Distributions: Multipole Moments, The Cartesian Multipole Expansion, The Spherical Polar Multipole expansion, Interactions with the Field, Electric Dipoles, Magnetic Dipoles, and Potential Energy.	Theoretical	General questions +Exam
5	**2 hours**	Chapter5	Slowly Varying Fields in Vacuum: Magnetic Induction, Electromotive Force, Magnetically Induced Motional EMF, Time-Dependent Magnetic Fields, and Faraday's Law.	Theoretical	General questions +Exam
6	**2 hours**	Chapter6	Displacement Current**,** Maxwell's Equations, The Potentials, The Lorentz Force and Canonical Momentum, Wave Equation in Vacuum, and Plane Waves.	Theoretical	General questions +Exam
7	**2 hours**		**Exam**	Theoretical	Exam

8	**2 hours**	Chapter7	Energy and Momentum: Energy of a Charge Distribution, Stationary Charges, Coefficients of Potential, Forces on Charge Distributions, and Potential Energy of Currents.	Theoretical	General questions +Exam
9	**2 hours**	Chapter8	Poynting's theorem, Magnetic Monopoles, and Duality Transformations.	Theoretical	General questions +Exam
10	**2 hours**	Chapter9	Static Potentials in Vacuum – Laplace's Equation: Laplace's equation, Uniqueness Theorem, and Laplace's equation in one Dimension.	Theoretical	General questions +Exam
11	**2 hours**	Chapter10	Laplace's equation in two Dimensions**:** Cartesian Coordinates in Two Dimensions, Plane Polar Coordinates, and Spherical Polar Coordinates with Axial Symmetry.	Theoretical	General questions +Exam
12	**2 hours**	Chapter11	Laplace's equation in three dimensions: Cylindrical Polar Coordinates, and Spherical Polar Coordinates.	Theoretical	General questions +Exam
13	**2 hours**	Chapter12	Static Potentials with Sources – Poisson's Equation, Image charges: The infinite conducting plane.	Theoretical	General questions +Exam
14	**2 hours**	Chapter1	Image charges: The conducting sphere, The conducting cylinder and image line charges.	Theoretical	General questions +Exam
15	**2 hours**	Chapter13	Green's Functions: Green's Theorem, Poisson's Equation and Green's Theorem.	Theoretical	General questions +Exam
16	**2 hours**	Chapter14	**Final Exam**	Theoretical	

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)	Classical Electromagnetic Theory, *by* Jack Vanderlinde, 2005 Springer Science.
Main references (sources)	none

Recommended books and references (scientific journals, reports…)	none
Electronic References, Websites	none

Course Description Form

1. Course Name:
Solar Energy and Solar Cells
2. Course Code:
PES 411
3. Semester / Year:
First semester / Fourth stage
4. Description Preparation Date:
2024-4-2
5. Available Attendance Forms:
Weekly
6. Number of Credit Hours (Total) / Number of Units (Total)
30 hours
7. Course administrator's name (mention all, if more than one name)
Name: **Maysoon Ahmed** Email: **maysoon.ahmed@sc.uobaghdad.edu.iq**
8. Course Objectives

Course Objectives	Teaching students the basic principles of physics. 2. Preparing specialists in the field of general physics and its practical applications, which bears the responsibility of studying the country's need for development and progress and capable of meeting the needs of the job market in state institutions and industry sectors. 3. Preparing an educated generation armed with science and adopts it as a sound basis to bring about radical changes and assign scientific knowledge and scientific methods in thinking, analysis and adaptation with the development of technologies, to keep up with the expansion of human needs. 4. Effective contribution for deepening and documenting the connection of the university with the society through the implementation of advisory counseling, training and development of teaching and administrative staff. 5. The service of preparing graduates specialized in physics who contribute to development in the country. 6. Meeting the needs of various sectors with highly qualified personals in the field of physics. 7. Encouraging the distinguished in this field to work as teaching assistants in the department to be part of the academic teaching staff in the future.

9. Teaching and Learning Strategies

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

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	**2 hours**	Chapter1	- Introduction - Sun and earth	Theoretical	General questions +Exam
2	**2 hours**	Chapter2	- Effects of the atmosphere Solar Radiation (direct radiation, diffuse radiation, reflect radiation, global radiation)	Theoretical	General questions +Exam
3	**2 hours**	Chapter3	- Blackbody radiation and solar spectrum - Solar energy	Theoretical	General questions +Exam
4	**2 hours**	Chapter4	- Temperature - Energy resources and forms - The greenhouse effect	Theoretical	General questions +Exam
5	**2 hours**	Chapter5	- Air mass and azimuth angle - Properties of light - Energy of photon, photon flux, spectral irradiance, radiant energy	Theoretical	General questions +Exam
6	**2 hours**	Chapter6	1st Examination	Theoretical	General questions +Exam
7	**2 hours**		Semiconductors for PV (materials, bonds, effective mass and structure)	Theoretical	Exam
8	**2 hours**	Chapter7	Types of Semiconductors (intrinsic and extrinsic)	Theoretical	General questions +Exam
9	**2 hours**	Chapter8	Optical properties of semiconductors	Theoretical	General questions +Exam
10	**2 hours**	Chapter9	Electrical properties of semiconductors	Theoretical	General questions +Exam
11	**2 hours**	Chapter10	Photoelectric and photovoltaic effect	Theoretical	General questions +Exam
12	**2 hours**	Chapter11	p-n Junction	Theoretical	General questions +Exam
13	**2 hours**	Chapter12	- Solar cell (materials, types and applications)	Theoretical	General questions +Exam

			Characterization of solar cell		
14	**2 hours**	Chapter1	Figure of merit of solar cells	Theoretical	General questions +Exam
15	**2 hours**	Chapter13	2nd Examination	Theoretical	General questions +Exam
16	**2 hours**	Chapter14	- Effects of the atmosphere Solar Radiation (direct radiation, diffuse radiation, reflect radiation, global radiation)	Theoretical	

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)	none
Recommended books and references (scientific journals, reports…)	none
Electronic References, Websites	none

Course Description Form

1. Course Name:
Nano Technology
2. Course Code:
PES 411
3. Semester / Year:
First semester / Fourth stage
4. Description Preparation Date:
2024-4-2
5. Available Attendance Forms:
Weekly
6. Number of Credit Hours (Total) / Number of Units (Total)
30 hours
7. Course administrator's name (mention all, if more than one name)
Name: Dr. **Wasan Saleh** Email: **wasan.saleh@sc.uobaghdad.edu.iq**
8. Course Objectives

Course Objectives	Teaching students the basic principles of physics. 2. Preparing specialists in the field of general physics and its practical applications, which bears the responsibility of studying the country's need for development and progress and capable of meeting the needs of the job market in state institutions and industry sectors. 3. Preparing an educated generation armed with science and adopts it as a sound basis to bring about radical changes and assign scientific knowledge and scientific methods in thinking, analysis and adaptation with the development of technologies, to keep up with the expansion of human needs. 4. Effective contribution for deepening and documenting the connection of the university with the society through the implementation of advisory counseling, training and development of teaching and administrative staff. 5. The service of preparing graduates specialized in physics who contribute to development in the country. 6. Meeting the needs of various sectors with highly qualified personals in the field of physics. 7. Encouraging the distinguished in this field to work as teaching assistants in the department to be part of the academic teaching staff in the future.

9. Teaching and Learning Strategies

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

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	**2 hours**	Chapter1	Introduction: Philosophy, What is Nanotechnology? History, Definitions	Theoretical	General questions +Exam
2	**2 hours**	Chapter2	The Scale of Things, Future Applications, Why nanoscale has become so important?	Theoretical	General questions +Exam
3	**2 hours**	Chapter3	Moor's Law, Structure of Nanomaterials Quantum Confinement in Semiconductors, Types of Electron Confinements	Theoretical	General questions +Exam
4	**2 hours**	Chapter4	Differences between top-down and bottom-up approaches, Advantages and Disadvantages of top-down and bottom-up approaches	Theoretical	General questions +Exam
5	**2 hours**	Chapter5	Fabrication conditions of nanomaterials, Parameters of Nanostructures 1. Fermi wavelength 2. Exciton Bohr radius	Theoretical	General questions +Exam
6	**2 hours**	Chapter6	Nano-Scale Effects on Properties, Size-Dependent Properties, Reasons for Size-Dependent Properties	Theoretical	General questions +Exam
7	**2 hours**			Theoretical	Exam
8	**2 hours**	Chapter7	Reason for change in optical properties in nanoscale, Examples of properties change	Theoretical	General questions +Exam
9	**2 hours**	Chapter8	Different Size-Dependent Properties (Part 1)	Theoretical	General questions +Exam
10	**2 hours**	Chapter9	Different Size-Dependent Properties (Part 2)	Theoretical	General questions +Exam
11	**2 hours**	Chapter10	Manufacturing Methods of Nanomaterials: Top-down Methods	Theoretical	General questions +Exam
12	**2 hours**	Chapter11	Manufacturing Methods of Nanomaterials Bottom-up Methods:	Theoretical	General questions +Exam

13	**2 hours**	Chapter12	Example of Nanomaterials, Carbon nanotubes	Theoretical	General questions +Exam
14	**2 hours**		**Review**	Theoretical	General questions +Exam
15	**2 hours**		**Final Exam**	Theoretical	General questions +Exam

11. Course Evaluation

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

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	
Main references (sources)	none
Recommended books and references (scientific journals, reports…)	none
Electronic References, Websites	none

Course Description Form

1. Course Name:
Nuclear Physics Lab.
2. Course Code:
PPP 421
3. Semester / Year:
First semester / Fourth stage
4. Description Preparation Date:
2024-4-2
5. Available Attendance Forms:
Weekly
6. Number of Credit Hours (Total) / Number of Units (Total)
30 hours
7. Course administrator's name (mention all, if more than one name)
Name: Email:
8. Course Objectives

Course Objectives	This module provides an introduction to essential computer skills. In this module, students will learn, • computer literacy, including hardware and software fundamentals in theory as well as practical. • various office applications (Microsoft Word, Excel, and PowerPoint), where students will use these software applications to create a current resume, and slide presentation. • basic computer knowledge and skills required to obtain an understanding of computer hardware, software, Internet, and web search.

9. Teaching and Learning Strategies

Strategy	By the end of this module, students should be able to: 1. Understand computer hardware, software components, and peripheral devices, enabling them to use computers confidently. 2. Manage and organize files and folders on a computer effectively, including creating, renaming, moving, and deleting files and folders. 3. Efficiently employ Microsoft Office to execute fundamental tasks with ease. 4. Navigate the internet and communicate via email, while understanding internet safety. Upon finishing the course, students will be aware of the ethical and security considerations when using computers, promoting safe and responsible digital behavior.

10. Course Structure

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

1	**2 hours**		Introduction: Detailed explanation about the nuclear laboratory	Theoretical	1
2	**2 hours**		Radiation risks and prevention: How to prevent radiation	Theoretical	2
3	**2 hours**		electronic devices: Pulse to Noise Ratio	Theoretical	3
4	**2 hours**		Experiment No. (1): G.M. Plateau	Theoretical	4
5	**2 hours**		Experiment No. (2): The relative stability region of scintillation detector	Theoretical	5
6	**2 hours**		Experiment No. (3): Study the differential spectrum of gamma ray and the effect of the window aperture of single channel analyzer on it	Theoretical	6
7	**2 hours**		**Exam**	Theoretical	7
8	**2 hours**	Chapter7	Experiment No. (4): The differential spectrum of gamma ray	Theoretical	8
9	**2 hours**	Chapter8	Experiment No. (5): Effect the high voltage for scintillation detector in gamma-ray spectrum	Theoretical	9
10	**2 hours**	Chapter9	Experiment No. (6): Effect the gain of the amplifier in gamma-ray spectrum	Theoretical	10
11	**2 hours**	Chapter10	Experiment No. (7): Statistical fluctuation in random processes	Theoretical	11
12	**2 hours**	Chapter11	Experiment No. (8): Least Square Linear Fitting	Theoretical	12
13	**2 hours**	Chapter12	Experiment No. (9): Deflection of beta radiation in a magnetic field	Theoretical	13
14	**2 hours**		Experiment No. (10): The integral spectrum of gamma ray	Theoretical	14
15	**2 hours**		Experiments review	Theoretical	

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)	No
Main references (sources)	No
Recommended books and references (scientific journals, reports…)	No
Electronic References, Websites	No

Course Description Form

1. Course Name:
Solid State Lab.
2. Course Code:
PPP 421
3. Semester / Year:
First semester / Fourth stage
4. Description Preparation Date:
2024-4-2
5. Available Attendance Forms:
Weekly
6. Number of Credit Hours (Total) / Number of Units (Total)
30 hours
7. Course administrator's name (mention all, if more than one name)
Name Email:
8. Course Objectives

Course Objectives	Teaching students the basic principles of physics. 2. Preparing specialists in the field of general physics and its practical applications, which bears the responsibility of studying the country's need for development and progress and capable of meeting the needs of the job market in state institutions and industry sectors. 3. Preparing an educated generation armed with science and adopts it as a sound basis to bring about radical changes and assign scientific knowledge and scientific methods in thinking, analysis and adaptation with the development of technologies, to keep up with the expansion of human needs. 4. Effective contribution for deepening and documenting the connection of the university with the society through the implementation of advisory counseling, training and development of teaching and administrative staff. 5. The service of preparing graduates specialized in physics who contribute to development in the country. 6. Meeting the needs of various sectors with highly qualified personals in the field of physics. 7. Encouraging the distinguished in this field to work as teaching assistants in the department to be part of the academic teaching staff in the future.

9. Teaching and Learning Strategies

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

10. Course Structure

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

1	**2 hours**		Crystalline systems (Part A)	Theoretical	General questions +Exam
2	**2 hours**		Crystalline systems (Part B)	Theoretical	General questions +Exam
3	**2 hours**		x-ray diffraction (Part A)	Theoretical	General questions +Exam
4	**2 hours**		x-ray diffraction (Part B)	Theoretical	General questions +Exam
5	**2 hours**		Electron diffraction	Theoretical	General questions +Exam
6	**2 hours**		Zeeman effect	Theoretical	General questions +Exam
7	**2 hours**		**Exam**	Theoretical	Exam
8	**2 hours**		Compensation and Revision	Theoretical	General questions +Exam
9	**2 hours**		Susceptibility of diamagnetic properties	Theoretical	General questions +Exam
10	**2 hours**		Some electrical properties for Ferroelectric TGA crystal	Theoretical	General questions +Exam
11	**2 hours**		Nuclear magnetic resonance NMR	Theoretical	General questions +Exam
12	**2 hours**		Piezo-electric of quartz crystal	Theoretical	General questions +Exam
13	**2 hours**		Electrical resonance **(part A)**	Theoretical	General questions +Exam
14	**2 hours**		Electrical resonance **(part B)**	Theoretical	General questions +Exam
15	**2 hours**		**Compensation and Revision**	Theoretical	General questions +Exam
16	**2 hours**			**Final Exam**	
11. Course Evaluation					

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

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	
Main references (sources)	
Recommended books and references (scientific journals, reports…)	none
Electronic References, Websites	none

Course Description Form

1. Course Name:
Virtual Lab.
2. Course Code:
PPP 421
3. Semester / Year:
First semester / Fourth stage
4. Description Preparation Date:
2024-4-2
5. Available Attendance Forms:
Weekly
6. Number of Credit Hours (Total) / Number of Units (Total)
30 hours
7. Course administrator's name (mention all, if more than one name)
Name Email:
8. Course Objectives

Course Objectives	Teaching students the basic principles of physics. 2. Preparing specialists in the field of general physics and its practical applications, which bears the responsibility of studying the country's need for development and progress and capable of meeting the needs of the job market in state institutions and industry sectors. 3. Preparing an educated generation armed with science and adopts it as a sound basis to bring about radical changes and assign scientific knowledge and scientific methods in thinking, analysis and adaptation with the development of technologies, to keep up with the expansion of human needs. 4. Effective contribution for deepening and documenting the connection of the university with the society through the implementation of advisory counseling, training and development of teaching and administrative staff. 5. The service of preparing graduates specialized in physics who contribute to development in the country. 6. Meeting the needs of various sectors with highly qualified personals in the field of physics. 7. Encouraging the distinguished in this field to work as teaching assistants in the department to be part of the academic teaching staff in the future.

9. Teaching and Learning Strategies

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

10. Course Structure

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

1	**2 hours**		**Introduction**	Theoretical	General questions +Exam
2	**2 hours**		**Density**	Theoretical	General questions +Exam
3	**2 hours**		**Alpa decay**	Theoretical	General questions +Exam
4	**2 hours**		**Beta decay**	Theoretical	General questions +Exam
5	**2 hours**		**Lambert Law**	Theoretical	General questions +Exam
6	**2 hours**		**Experiments review**	Theoretical	General questions +Exam
7	**2 hours**		**exam**	Theoretical	Exam
8	**2 hours**		**Capacitors (Series)**	Theoretical	General questions +Exam
9	**2 hours**		**Capacitors (Parallel)**	Theoretical	General questions +Exam
10	**2 hours**		**Bohr model**	Theoretical	General questions +Exam
11	**2 hours**		**Radioactive dating**	Theoretical	General questions +Exam
12	**2 hours**		**Experiments review**	Theoretical	General questions +Exam
13	**2 hours**		**Second exam**	Theoretical	General questions +Exam
14	**2 hours**		**Exam (Theoretical)**	Theoretical	General questions +Exam
15	**2 hours**			**Final Exam**	

11. Course Evaluation

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

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	

Main references (sources)	
Recommended books and references (scientific journals, reports…)	none
Electronic References, Websites	none

Course Description Form

1. Course Name:
Nuclear Physics 2
2. Course Code:
PHYS 4844
3. Semester / Year:
Second semester / fourth Stage
4. Description Preparation Date:
2024-4-2
5. Available Attendance Forms:
Weekly
6. Number of Credit Hours (Total) / Number of Units (Total)
30 hours
7. Course administrator's name (mention all, if more than one name)
Name: Prof. Dr. Asia H. Al-Mashhadani Email: asia.hammad@sci.uobaghdad.edu.iq
8. Course Objectives

Course Objectives	Teaching students the basic principles of physics. 2. Preparing specialists in the field of general physics and its practical applications, which bears the responsibility of studying the country's need for development and progress and capable of meeting the needs of the job market in state institutions and industry sectors. 3. Preparing an educated generation armed with science and adopts it as a sound basis to bring about radical changes and assign scientific knowledge and scientific methods in thinking, analysis and adaptation with the development of technologies, to keep up with the expansion of human needs. 4. Effective contribution for deepening and documenting the connection of the university with the society through the implementation of advisory counseling, training and development of teaching and administrative staff. 5. The service of preparing graduates specialized in physics who contribute to development in the country. 6. Meeting the needs of various sectors with highly qualified personals in the field of physics. 7. Encouraging the distinguished in this field to work as teaching assistants in the department to be part of the academic teaching staff in the future.

9. Teaching and Learning Strategies

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

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2 hours	**Chapter 1**	1- Nuclear Models Liquid – Drop Model	Theoretical	General questions +Exam
2	2 hours		1-2 The Semi – Empirical Mass Formula	Theoretical	General questions +Exam
3	2 hours		1-3 Fermi – Gas Model ,	Theoretical	General questions +Exam
4	2 hours		1-4 Simple Shell Model	Theoretical	General questions +Exam
5	2 hours		1-5 Spin – Orbit Potential	Theoretical	General questions +Exam
6	2 hours	**Chapter 2**	2- Decay processes 2-1 Natural Radioactivity,	Theoretical	General questions +Exam
7	2 hours		Exam	Theoretical	Exam
8	2 hours		2-2 α – Decay	Theoretical	General questions +Exam
9	2 hours		2-3 β – Decay	Theoretical	General questions +Exam
10	2 hours		2-4 γ – Decay	Theoretical	General questions +Exam
11	2 hours	**Chapter 3**	3- Nuclear Reactions	Theoretical	General questions +Exam
12	2 hours		3-1 Introduction to Nuclear Reactions	Theoretical	General questions +Exam
13	2 hours		3-2 Compound Nucleus	Theoretical	General questions +Exam
14	2 hours		3-3 Pre – Equilibrium Reactions 3-4 Direct Reactions (Optical Model)	Theoretical	General questions +Exam
15	2 hours		3-5 Fission Reaction 3-6Fusion Reaction	Theoretical	General questions +Exam

11. Course Evaluation

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

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	References: 1. Nuclear Physics Concept, By Walter E. Meyerhof. 2. Introductory: Nuclear Physics, By Krane. 3. Lecture Notes of Massachusetts Institute of Technology.
Main references (sources)	
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

Course Description Form

13. Course Name:	
Solid State physics (2)	
14. Course Code:	
PHY 4845	
15. Semester / Year:	
Second semester / fourth Stage	
16. Description Preparation Date:	
2024-4-2	
17.Available Attendance Forms:	
Weekly	
18.Number of Credit Hours (Total) / Number of Units (Total)	
30 hours	
19. Course administrator's name (mention all, if more than one name)	
Name: Dr. Farah Tariq M. Noori Email:	
20. Course Objectives	
Course Objectives	Teaching students the basic principles of physics. 2. Preparing specialists in the field of general physics and its practical applications, which bears the responsibility of studying the country's need for development and progress and capable of meeting the needs of the job market in state institutions and industry sectors. 3. Preparing an educated generation armed with science and adopts it as a sound basis to bring about radical changes and assign scientific knowledge and scientific methods in thinking, analysis and adaptation with the development of technologies, to keep up with the expansion of human needs. 4. Effective contribution for deepening and documenting the connection of the university with the society through the implementation of advisory counseling, training and development of teaching and administrative staff. 5. The service of preparing graduates specialized in physics who contribute to development in the country. 6. Meeting the needs of various sectors with highly qualified personals in the field of physics. 7. Encouraging the distinguished in this field to work as teaching assistants in the department to be part of the academic teaching staff in the future.
21. Teaching and Learning Strategies	
Strategy	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students
22. Course Structure	

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	**2 hours**	Chapter1	8- Band theory: Energy levels and energy bands, Nearly free electron model	Theoretical	General questions +Exam
2	**2 hours**	Chapter2	Bragg reflection and energy gap, Bloch function, Kronig-Penney model, Brillouin zones	Theoretical	General questions +Exam
3	**2 hours**	Chapter3	Fermi surfaces, effective mass, Hall effect.	Theoretical	General questions +Exam
4	**2 hours**	Chapter4	9-Semiconductor crystals: Intrinsic semiconductor, Direct and indirect absorption, Intrinsic carrier concentration, Extrinsic semiconductor,	Theoretical	General questions +Exam
5	**2 hours**	Chapter5	N-type semiconductor, p-type semiconductor, Concentration of electrons and holes in doped semiconductor	Theoretical	General questions +Exam
6	**2 hours**	Chapter6	mobility, electrical conductivity, Photoconductivity, Exciton.	Theoretical	General questions +Exam
7	**2 hours**		**Exam**	Theoretical	Exam
8	**2 hours**	Chapter7	10-Crystal Defect: Point defect in a lattice, Diffusion, Dislocation (line imperfection, Edge dislocation, Screw dislocation, Burger's vector, dislocation movement, Surface defects (Planar defects), Stacking faults, Grain Boundaries, Volume defects (Bulk defects).	Theoretical	General questions +Exam
9	**2 hours**	Chapter8	11-Superconductivity: Applications of Superconductivity, Superconducting Properties: Critical Temperature, Critical Magnetic field, Critical current density	Theoretical	General questions +Exam
10	**2 hours**	Chapter9	Meissner Effect, Penetration depth, BCS Theory of Superconductivity,	Theoretical	General questions +Exam
11	**2 hours**	Chapter10	Coherence length, Types of Superconductors, Perovskite, Superconductivity in high	Theoretical	General questions +Exam

			temperature superconductor		
12	**2 hours**	Chapter11	12-Magnetic Properties of Solids: Diamagnetic materials, Paramagnetic material, Curie's law	Theoretical	General questions +Exam
13	**2 hours**	Chapter12	Ferromagnetic materials, Bloch wall, Antiferromagnetism, Ferrimagnetism	Theoretical	General questions +Exam
14	**2 hours**	Chapter1	Magnetic Resonance ESR (electron spin resonance)	Theoretical	General questions +Exam
15	**2 hours**	Chapter13	NMR (nuclear magnetic resonance).	Theoretical	General questions +Exam
16	**2 hours**	Chapter14	**Final Exam**	Theoretical	

23. Course Evaluation

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

24. Learning and Teaching Resources

Required textbooks (curricular books, if any)	- Kittle , C., " Introduction to SolidState Physics" 8th ed., 2007 WileyWestern Limited, New York . 2- Omar, MA., " Elementary SolidState Physics"
Main references (sources)	None
Recommended books and references (scientific journals, reports…)	none
Electronic References, Websites	none

Course Description Form

1. Course Name:
Electromagnetic Theory (2)
2. Course Code:
PHY 4846
3. Semester / Year:
Second semester / fourth Stage
4. Description Preparation Date:
2024-4-2
5. Available Attendance Forms:
Weekly
6. Number of Credit Hours (Total) / Number of Units (Total)
30 hours
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Thamir H. Khalaf Email: Thamir.Khalaf@sc.uobaghdad.edu.iq
8. Course Objectives

Course Objectives	Teaching students the basic principles of physics. 2. Preparing specialists in the field of general physics and its practical applications, which bears the responsibility of studying the country's need for development and progress and capable of meeting the needs of the job market in state institutions and industry sectors. 3. Preparing an educated generation armed with science and adopts it as a sound basis to bring about radical changes and assign scientific knowledge and scientific methods in thinking, analysis and adaptation with the development of technologies, to keep up with the expansion of human needs. 4. Effective contribution for deepening and documenting the connection of the university with the society through the implementation of advisory counseling, training and development of teaching and administrative staff. 5. The service of preparing graduates specialized in physics who contribute to development in the country. 6. Meeting the needs of various sectors with highly qualified personals in the field of physics. 7. Encouraging the distinguished in this field to work as teaching assistants in the department to be part of the academic teaching staff in the future.

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

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	**2 hours**	Chapter1	Static Electromagnetic Fields in Matter: The Electric Field Due to a Polarized Dielectric, Description of dielectrics, The electric displacement field.	Theoretical	General questions +Exam
2	**2 hours**	Chapter2	Magnetic Induction Field Due to a Magnetized Material, Magnetic field intensity, The Hysteresis Curve of a Ferromagnetic**.**	Theoretical	General questions +Exam
3	**2 hours**	Chapter3	Time-Dependent Electric Fields in Matter: Maxwell's Equations**,** Energy of electric and magnetic field.	Theoretical	General questions +Exam
4	**2 hours**	Chapter4	The electromagnetic potentials. Plane waves in material media. Plane waves in tenuous plasma.	Theoretical	General questions +Exam
5	**2 hours**	Chapter5	Waveguide Propagation: Bounded waves, TM modes in a rectangular waveguide.	Theoretical	General questions +Exam
6	**2 hours**	Chapter6	Cylindrical Waveguides, Circular Cylindrical Waveguides, Resonant Cavities.	Theoretical	General questions +Exam
7	**2 hours**		**Exam**	Theoretical	Exam
8	**2 hours**	Chapter7	Dissipation by Eddy Currents, Dielectric Waveguides (Optical Fibers), HE Modes.	Theoretical	General questions +Exam
9	**2 hours**	Chapter8	Electromagnetic Radiation, The Inhomogeneous Wave Equation, Solution by Fourier Analysis, Green's Function for the Inhomogeneous Wave Equation.	Theoretical	General questions +Exam
10	**2 hours**	Chapter9	Radiation from a Localized Oscillating Source, Electric Dipole Radiation, Magnetic Dipole and Electric Quadrupole Radiation.	Theoretical	General questions +Exam
11	**2 hours**	Chapter10	Radiation by Higher Order Moments, Energy and Angular Momentum of the Multipole Fields, Radiation from Extended Sources	Theoretical	General questions +Exam

12	**2 hours**	Chapter11	Li´enard-Wiechert Potentials, The Li´enard-Wiechert Potentials Using Green's Functions, The Fields Of a Moving Charge, Radiation from Slowly Moving Charges.	Theoretical	General questions +Exam
13	**2 hours**	Chapter12	Thompson Scattering, Radiation by Relativistic Charges, Synchrotron Radiation, Bremstrahlung and Cherenkov radiation.	Theoretical	General questions +Exam
14	**2 hours**	Chapter1	Radiation Reaction – Electrodynamics, Electromagnetic Inertia, The Reaction Force Needed to Conserve energy, Direct Calculation of Radiation Reaction – The Abraham-Lorentz Model.	Theoretical	General questions +Exam
15	**2 hours**	Chapter13	The Equation of Motion, The Covariant equation of Motion, Alternative Formulations.	Theoretical	General questions +Exam
16	**2 hours**	Chapter14	**Final Exam**	Theoretical	

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)	Classical Electromagnetic Theory, *by* Jack Vanderlinde, 2005 Springer Science.
Main references (sources)	none
Recommended books and references (scientific journals, reports…)	none
Electronic References, Websites	none

Course Description Form

1. Course Name:
Plasma Physics
2. Course Code:
PHY 4847
3. Semester / Year:
Second semester / fourth Stage
4. Description Preparation Date:
2024-4-2
5. Available Attendance Forms:
Weekly
6. Number of Credit Hours (Total) / Number of Units (Total)
30 hours
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Qusay Adnan Abbas Email: qusay.a@sc.uobaghdad.edu.iq
8. Course Objectives

Course Objectives	Teaching students the basic principles of physics. 2. Preparing specialists in the field of general physics and its practical applications, which bears the responsibility of studying the country's need for development and progress and capable of meeting the needs of the job market in state institutions and industry sectors. 3. Preparing an educated generation armed with science and adopts it as a sound basis to bring about radical changes and assign scientific knowledge and scientific methods in thinking, analysis and adaptation with the development of technologies, to keep up with the expansion of human needs. 4. Effective contribution for deepening and documenting the connection of the university with the society through the implementation of advisory counseling, training and development of teaching and administrative staff. 5. The service of preparing graduates specialized in physics who contribute to development in the country. 6. Meeting the needs of various sectors with highly qualified personals in the field of physics. 7. Encouraging the distinguished in this field to work as teaching assistants in the department to be part of the academic teaching staff in the future.

9. Teaching and Learning Strategies

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

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	**2 hours**	Chapter1	Introduction: Occurrence of Plasmas in Nature, Definition of Plasma, Concept of Temperature, Debye Shielding, The Plasma Parameter, Criteria for Plasmas.	Theoretical	General questions +Exam
2	**2 hours**	Chapter2	Applications of Plasma Physics: Gas Discharges (Gaseous Electronics), Controlled Thermonuclear Fusion, Space Physics, Modern Astrophysics, MHD Energy Conversion and Ion Propulsion, Solid State Plasmas, Gas, Particle Accelerators, Industrial Plasmas, Atmospheric Plasmas.	Theoretical	General questions +Exam
3	**2 hours**	Chapter3	Single-Particle Motions: Introduction, Uniform E and B Fields, $E = 0$, Finite E, Gravitational Field, Non-uniform B Field, ∇B⊥B: Grad-B Drift, Curved B: Curvature Drift, ∇B∥B: Magnetic Mirrors.	Theoretical	General questions +Exam
4	**2 hours**	Chapter4	Non-uniform E Field, Time-Varying E Field, Time-Varying B Field, Summary of Guiding Center Drifts, Adiabatic Invariants.	Theoretical	General questions +Exam
5	**2 hours**	Chapter5	Plasmas as Fluids: Introduction, Relation of Plasma Physics to Ordinary Electromagnetics, Maxwell's Equations, Classical Treatment of Magnetic Materials, Classical Treatment of Dielectrics.	Theoretical	General questions +Exam
6	**2 hours**	Chapter6	The Dielectric Constant of a Plasma, The Fluid Equation of Motion, The Convective Derivative, The Stress Tensor, Collisions. Comparison with Ordinary Hydrodynamics.	Theoretical	General questions +Exam
7	**2 hours**		**Exam**	Theoretical	Exam

8	**2 hours**	Chapter7	Equation of Continuity, Equation of State, The Complete Set of Fluid Equations, Fluid Drifts Perpendicular to B, Fluid Drifts Parallel to B, The Plasma Approximation.	Theoretical	General questions +Exam
9	**2 hours**	Chapter8	Waves in Plasmas: Representation of Waves, Group Velocity, Plasma Oscillations, Electron Plasma Waves, Sound Waves, Ion Waves, Validity of the Plasma Approximation.	Theoretical	General questions +Exam
10	**2 hours**	Chapter9	Comparison of Ion and Electron Waves, Electrostatic Electron Oscillations Perpendicular to B, Electrostatic Ion Waves Perpendicular to B, The Lower Hybrid Frequency, Electromagnetic Waves with B_0=0, Experimental Applications, Electromagnetic Waves Perpendicular to B0.	Theoretical	General questions +Exam
11	**2 hours**	Chapter10	Cutoffs and Resonances, Electromagnetic Waves Parallel to B0, Experimental Consequences, The Whistler Mode, Faraday Rotation.	Theoretical	General questions +Exam
12	**2 hours**	Chapter11	Hydromagnetic Waves: Magnetosonic Waves, Summary of Elementary Plasma Waves, CMA Diagram.	Theoretical	General questions +Exam
13	**2 hours**	Chapter12	Diffusion and Mobility in Weakly Ionized Gases, Decay of a Plasma by Diffusion, Steady State Solutions, and Recombination.	Theoretical	General questions +Exam
14	**2 hours**	Chapter1	Diffusion Across a Magnetic Field: Ambipolar Diffusion Across B, Experimental Checks, Collisions in Fully Ionized Plasmas: Plasma Resistivity, Mechanics of Coulomb Collisions.	Theoretical	General questions +Exam
15	**2 hours**	Chapter13	The Single-Fluid MHD Equations: Diffusion of Fully Ionized Plasmas, Solutions of the Diffusion Equation, Bohm	Theoretical	General questions +Exam

			Diffusion and Neoclassical Diffusion.		
16	**2 hours**		**Final exam**	Theoretical	

11. Course Evaluation

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

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	1-Introduction to Plasma Physics a Controlled Fusion, Third Edition, by F Chen, 2016
Main references (sources)	
Recommended books and references (scientific journals, reports…)	none
Electronic References, Websites	none

Course Description Form

1. Course Name:
Nuclear Physics Lab.
2. Course Code:
PPP 421
3. Semester / Year:
Second semester / fourth Stage
4. Description Preparation Date:
2024-4-2
5. Available Attendance Forms:
Weekly
6. Number of Credit Hours (Total) / Number of Units (Total)
30 hours
7. Course administrator's name (mention all, if more than one name)
Name: Email:
8. Course Objectives

Course Objectives	This module provides an introduction to essential computer skills. In this module, students will learn, • computer literacy, including hardware and software fundamentals in theory as well as practical. • various office applications (Microsoft Word, Excel, and PowerPoint), where students will use these software applications to create a current resume, and slide presentation. • basic computer knowledge and skills required to obtain an understanding of computer hardware, software, Internet, and web search.

9. Teaching and Learning Strategies

Strategy	By the end of this module, students should be able to: 1. Understand computer hardware, software components, and peripheral devices, enabling them to use computers confidently. 2. Manage and organize files and folders on a computer effectively, including creating, renaming, moving, and deleting files and folders. 3. Efficiently employ Microsoft Office to execute fundamental tasks with ease. 4. Navigate the internet and communicate via email, while understanding internet safety. Upon finishing the course, students will be aware of the ethical and security considerations when using computers, promoting safe and responsible digital behavior.

10. Course Structure

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

1	**2 hours**		Introduction: A detailed explanation of the experiments of the second semester	Theoretical	1
2	**2 hours**		Radiation risks: How to prevent radiation and use measuring devices	Theoretical	2
3	**2 hours**		Radiation interaction: Radiation interaction with matter	Theoretical	3
4	**2 hours**		Experiment No. (1): Attenuation Coefficient.	Theoretical	4
5	**2 hours**		Experiment No. (2): Radioactivity	Theoretical	5
6	**2 hours**		Experiment No. (3): Study efficiency and the effective factors on it for scintillation detector.	Theoretical	6
7	**2 hours**		**Exam**	Theoretical	7
8	**2 hours**		Experiment No. (4): Determination the efficiency in the absolute and intrinsic method.	Theoretical	8
9	**2 hours**		Experiment No. (5): Calculate Exposure to radiation	Theoretical	9
10	**2 hours**		Experiment No. (6): Bremsstrahlung ray.	Theoretical	10
11	**2 hours**		Experiment No. (7): Gamma-ray Spectrum Analysis using a Scintillation Detector	Theoretical	11
12	**2 hours**		Experiment No. (8): Buildup Factor	Theoretical	12
13	**2 hours**		Experiment No. (9): Compton Scattering.	Theoretical	13
14	**2 hours**		Experiment No. (10): The differential cross section; the scattering probability as a function of angle.	Theoretical	14
15	**2 hours**		Experiments review	Theoretical	

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)	No
Main references (sources)	No
Recommended books and references (scientific journals, reports…)	Wikipedia
Electronic References, Websites	Wikipedia

Course Description Form

1. Course Name:
Solid State Lab.
2. Course Code:
PPP 421
3. Semester / Year:
Second semester / fourth Stage
4. Description Preparation Date:
2024-4-2
5. Available Attendance Forms:
Weekly
6. Number of Credit Hours (Total) / Number of Units (Total)
30 hours
7. Course administrator's name (mention all, if more than one name)
Name Email:
8. Course Objectives

Course Objectives	Teaching students the basic principles of physics. 2. Preparing specialists in the field of general physics and its practical applications, which bears the responsibility of studying the country's need for development and progress and capable of meeting the needs of the job market in state institutions and industry sectors. 3. Preparing an educated generation armed with science and adopts it as a sound basis to bring about radical changes and assign scientific knowledge and scientific methods in thinking, analysis and adaptation with the development of technologies, to keep up with the expansion of human needs. 4. Effective contribution for deepening and documenting the connection of the university with the society through the implementation of advisory counseling, training and development of teaching and administrative staff. 5. The service of preparing graduates specialized in physics who contribute to development in the country. 6. Meeting the needs of various sectors with highly qualified personals in the field of physics. 7. Encouraging the distinguished in this field to work as teaching assistants in the department to be part of the academic teaching staff in the future.

9. Teaching and Learning Strategies

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

10. Course Structure

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

1	**2 hours**		X-ray absorption (part A)	Theoretical	General questions +Exam
2	**2 hours**		X-ray absorption (part B)	Theoretical	General questions +Exam
3	**2 hours**		Hall effect (part A)	Theoretical	General questions +Exam
4	**2 hours**		Hall effect (part B)	Theoretical	General questions +Exam
5	**2 hours**		Forbidden energy gap	Theoretical	General questions +Exam
6	**2 hours**		Seebeck effect	Theoretical	General questions +Exam
7	**2 hours**		**Exam**	Theoretical	Exam
8	**2 hours**		**Compensation and Revision**	Theoretical	General questions +Exam
9	**2 hours**		Solar cell (part A)	Theoretical	General questions +Exam
10	**2 hours**		Solar cell (part B)	Theoretical	General questions +Exam
11	**2 hours**		Some properties of Ferroelectric materials TGA crystal	Theoretical	General questions +Exam
12	**2 hours**		Electron spin resonance	Theoretical	General questions +Exam
13	**2 hours**		Measuring the difference of ordinary and extraordinary refractive index for quartz crystal using dark rings (part A)	Theoretical	General questions +Exam
14	**2 hours**		Electron spin resonance Measuring the difference of ordinary and extraordinary refractive index for quartz crystal using dark bands (part A)	Theoretical	General questions +Exam
15	**2 hours**		**Compensation and Revision**	Theoretical	General questions +Exam

16	**2 hours**		**Final Exam**	

11. Course Evaluation

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

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	
Main references (sources)	
Recommended books and references (scientific journals, reports…)	none
Electronic References, Websites	none

Course Description Form

1. Course Name:
Virtual Lab.
2. Course Code:
PPP 421
3. Semester / Year:
Second semester / fourth Stage
4. Description Preparation Date:
2024-4-2
5. Available Attendance Forms:
Weekly
6. Number of Credit Hours (Total) / Number of Units (Total)
30 hours
7. Course administrator's name (mention all, if more than one name)
Name Email:
8. Course Objectives

Course Objectives	Teaching students the basic principles of physics. 2. Preparing specialists in the field of general physics and its practical applications, which bears the responsibility of studying the country's need for development and progress and capable of meeting the needs of the job market in state institutions and industry sectors. 3. Preparing an educated generation armed with science and adopts it as a sound basis to bring about radical changes and assign scientific knowledge and scientific methods in thinking, analysis and adaptation with the development of technologies, to keep up with the expansion of human needs. 4. Effective contribution for deepening and documenting the connection of the university with the society through the implementation of advisory counseling, training and development of teaching and administrative staff. 5. The service of preparing graduates specialized in physics who contribute to development in the country. 6. Meeting the needs of various sectors with highly qualified personals in the field of physics. 7. Encouraging the distinguished in this field to work as teaching assistants in the department to be part of the academic teaching staff in the future.

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

10. Course Structure

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

1	**2 hours**		**Introduction**	Theoretical	General questions +Exam
2	**2 hours**		Bending light (I)	Theoretical	General questions +Exam
3	**2 hours**		Bending light (II)	Theoretical	General questions +Exam
4	**2 hours**		Curve fitting (I)	Theoretical	General questions +Exam
5	**2 hours**		Curve fitting (II)	Theoretical	General questions +Exam
6	**2 hours**		Experiments review	Theoretical	General questions +Exam
7	**2 hours**		First exam	Theoretical	Exam
8	**2 hours**		Schrodinger model of hydrogen atom	Theoretical	General questions +Exam
9	**2 hours**		Stern-Gerlach experiment	Theoretical	General questions +Exam
10	**2 hours**		Square well potential	Theoretical	General questions +Exam
11	**2 hours**		Harmonic Oscillator potential	Theoretical	General questions +Exam
12	**2 hours**		Experiments review	Theoretical	General questions +Exam
13	**2 hours**		Second exam	Theoretical	General questions +Exam
14	**2 hours**		Exam (Theoretical)	Theoretical	General questions +Exam
15	**2 hours**			**Final Exam**	

11. Course Evaluation

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

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	

Main references (sources)	
Recommended books and references (scientific journals, reports…)	none
Electronic References, Websites	none