Ministry of Higher Education and Scientific Research
Scientific Supervision and Evaluation
Department Assurance, Quality, and accreditation Academic
Department of Physics / Faculty of Science - Mustansiriya University
2024-2025

Academic Program and Course Description Guide

2025

Introduction:

The educational program is a coordinated and organized package of courses that include procedures and experiences organized in the form of academic vocabulary whose main purpose is to build and refine the skills of graduates, making them qualified to meet the requirements of the labor market, which is reviewed and evaluated annually through internal or external audit procedures and programs such as the external examiner program.

The description of the academic program provides a brief summary of the main features of the program and its courses, indicating the skills that are being worked on to acquire for students based on the objectives of the academic program, and the importance of this description is evident because it represents the cornerstone in obtaining program accreditation and is written jointly by the teaching staff under the supervision of the scientific committees in the scientific departments.

This guide, in its second version, includes a description of the academic program after updating the vocabulary and paragraphs of the previous guide in light of the developments and developments of the educational system in Iraq, which included the description of the academic program in its traditional form (Bologna, quarterly) system, as well as the adoption of the description of the academic program circulated according to the book of the Department of Studies T 3/2906 on 3/5/2023 .

In this regard, we can only emphasize the importance of writing a description of academic programs and courses to ensure the proper functioning of the educational process.

Concepts and terminology:

Academic Program Description: The description of the academic program 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 student to achieve, proving whether he has made the most of the available learning opportunities. It is derived from the description of the program.

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

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 (semester, yearly, Bologna track) whether it is a requirement (ministry, university, college and scientific department) with the number of study units.

Learning Outcomes**: A** compatible set of knowledge, skills and values acquired by the student 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 member to develop the student's teaching and learning, and they are plans that are followed to reach the learning goals. That is, describe all classroom and extra-curricular activities to achieve the learning outcomes of the program.

Academic Program Description For
University Name: Al-Mustansiriyah
Faculty/Science
Scientific Department: Physics

Academic or Vocational Program Name: Bachelor of Science in Physics

Final Certificate Name:.. Bachelor of Science in Physics

Academic system: Third and fourth stages courses
Date Description Setup: 5-3-2024
File filling date: 6-6-2024

Signature
Scientific Associate Name: Prof. Dr. Ahmed Mahdi Rahima
Date: : 1 / 7 /2025

Signature
Head of department: Prof. Firas Sabih Mohammed
Date: 1 / 7 /2025

Check the file before
Division of Quality Assurance and University Performance
Name of the Director of the Quality Assurance and University Performance Division:
Signature

Approval of the Dean Prof. Mithaq Talib Kati
Date : 1 / 7 /2025

1. **Program Vision**
The Department of Physics at the College of Science is keen to consolidate the scientific excellence of the students of the department and to emphasize information and knowledge The department also seeks to develop the skills and individual experiences of students to achieve a better career future and in line with the requirements of the labor market

2. **Program Mission**
Through its mission, the Department of Physics sought to prepare and prepare students who are scientifically and practically capable in the fields of physics Various and focus on the aspect of teaching skills and meet quality standards in preparing and qualifying distinguished graduates at the local and regional levels.

3. **Program Objectives**
Preparing scientifically qualified, skilled and experienced graduates to serve state institutions and society, public and private, and instilling the spirit of knowledge and disseminating it through scientific research and other activities such as seminars and conferences, in addition to preparing specialized scientific cadres who hold higher degrees, masters and doctorates in various disciplines of physics.

4. **Program Accreditation**
There isn't any

5. **Other external influences**
Field visits, practical part, scientific consultations, questionnaires for students, professors and employers

Program Structure						**6.**
Reviews*	**Percentage of units of study**	**Number of Units**	Practical Study Hours	**Theoreticalstudy hours**	**Number of Courses**	**Program Structure**

Basic Course	14.81%	20	-	12	7	**University Requirements**
Basic Course	26.00%	35	10	25	15	**College Requirements**
Basic Course	59.25 %	80	42	70	35	**Department Requirements**
		There isn't any	There isn't any		There isn't any	**Summer Training**
		135	52	112	57	**Total**

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

7. Program Description

Credit Hours		Course Name	Course or Course Code	Year/Level
Practical	**Theoretical**			
2	**2**	Mechanics and properties of a substance	508211113	The first
2	2	Electrical Section	508211113	
2	**2**	Magnetism	508211123	
-	2	mathematics	5000163	
2	**2**	Calculators	5086452	
-	**2**	General astronomy	5000120	
-	**2**	Human Rights	508211132	
2	-	democracy	5000120	
		Arabic language	508211222	
2	**2**	**Modern Physics (1)**	50821214	The second
2	2	**Thermodynamic heat**	5081220	
-	2	**Analytical Mechanics (1)**	5081310	
2	**2**	**Analogue electronics**	5081320	
-	**2**	**Mathematics (3)**	5082108	
-	**2**	**English Language (2)**	5086452	
2	-	**Calculators (3)**	5000164	
2	**2**	**Modern Physics (2)**	50821214	
2	2	**Thermodynamics & Statistics (2)**	50821224	
-	2	**Analytical Mechanics (2)**	5081310	
2	**2**	**Digital Electronics**	50812142	
-	**2**	**Mathematics (4)**	5082108	
-	**2**	**Sound and wave motion**	5086452	
2	-	**Calculators (4)**	5000164	
2	2	Engineering Optics	508213034	
2	2	Laser Physics (1)	5081325	
-	2	Quantitative Mechanics (1)	5081460	
2	2	Materials Physics (1)	5081355	
2	2	Numerical analysis	5082265	
-	2	English Language (3)	508213054	

-	2	Optional (1)	5086452	Third
2	2	Physical Optics	508213034	
2	2	Laser Physics (2)	5081325	
-	2	Quantitative Mechanics (2)	5081460	
2	2	Physics of Materials (2)	5081355	
2	2	Mathematics (5)	5082108	
-	2	Molecular physics	5081317	
-	2	Spectra	5083214	
-	2	Optional (2)	5086452	
2	2	Nuclear Physics (1)	5081470	Fourth
2	2	Solid State Physics (1)	5081465	
-	2	Electromagnetic Theory (1)	5081330	
-	2	Mathematical Physics (1)	50821214	
-	2	Nanoscience	508213064	
-	2	English (4)	508213054	
-	2	Optional (3)	5086452	
-	2	Research Project	508213074	
2	2	Nuclear Physics (2)	5081470	
2	2	Solid State Physics (2)	5081465	
-	2	Electromagnetic Theory (2)	5081330	
-	2	Mathematical Physics (2)	50821214	
-	2	Plasma Physics	5081485	
-	2	Biophysics	508213054	
-	2	Optional (4)	5086452	
-	2	Research Project	508213074	

8. Expected learning outcomes of the program

Knowledge

1 - The student should know the basics of physics.
2 - The program aims to raise the student's potential to the level of understanding in the field of physics as far as it is related to his specialization.
3 - Developing and raising the student's cognitive abilities .

Skills

- Teaching the student how to become a leader on logical thinking.
2 - Teach the student analysis and employ the vocabulary of the prescribed curriculum.
3 - Developing the mental and self-ability of the student in the specialization is an important part of his field of specialization.
4 - Providing the student with the ability to communicate and use modern educational techniques effectively.
5 - The ability to work collectively as part of a team in different fields .

Values

Developing students' abilities to understand the material

9. Teaching and Learning Strategies

1 - Theoretical lectures.
2 - Surprise exams after each lecture.
3 - Conduct scientific discussions.

4 - Urging the completion of various reports during the semester.
5 - Try to deal with the scientific material in a way that makes the student highly focused through questions and exchange
Cognitive among students.

10. Evaluation methods

1 - Daily, monthly tests.
2 - Scientific research.
3 - Conducting seminars for students to find out the extent of their comprehension of the material.
4 - Weekly, monthly, daily exams and the end-of-year exam.
5 - Discussion of graduation projects for students

Faculty			**Specialization**		Name	**Academic Rank**
Administrative status		**angel**	**special**	**year**		
Head of Department	angel	Phd	Laser & Optoelectronics	physics	Firas Sobeih Muhammad	professor
Preliminary Course	angel	Phd	Nuclear physics	physics	Walid Jabbar Muhanna	Assistant Professor
Higher Decision	angel	Phd	Atomic physics	physics	Nadia Jassim Ghadeeb	Assistant Professor
	angel	Phd	Image processing	physics	Ali Abd Dawood Al , Zabaki	professor
	angel	Phd	Nanomaterials	physics	Raad Saadoun Sabri	professor
	angel	Phd	Theoretical physics	physics	Ahmed Aziz Ahmed	professor

	angel	Phd	Materials Science	physics	Mahasen Fadel Hadi	professor
	angel	Phd	Materials Science	physics	Bahjat Bahlul Kazim	professor
	angel	Phd	Solid State Physics	physics	Wissam Jaafar Aziz	professor
	angel	Phd	laser	physics	Mazen Ali Abd Ali	professor
	angel	Phd	Thin Film	physics	Nazir Jassim Mohammed	professor
	angel	Phd	Thin Film	physics	Ahmed Naji Abdul qadir	professor
	angel	Phd	Photovoltaic	physics	Muayad Jabbar Zuri	professor
	angel	Phd	Materials Science	physics	Randa Kamel Hussein	professor
	angel	Phd	Radiation physics	physics	Nada Farhan Kazem	professor
	angel	Phd	Digital Image Processing	physics	Hazem Kata Dawai	professor
	angel	Phd	Digital Image Processing	physics	Mohamed Youssef Kamel	professor
	angel	Phd	Thin Film	physics	Muhammad Odeh Dawood	professor
	angel	Phd	Plasma Physics	physics	Beida Mohsen Ahmed	professor
	angel	Phd	Nanomaterials	physics	Aseel Mustafa Abdul majeed	professor
	angel	Phd	polymer	physics	Asrar Abdel Moneim Saeed	professor
	angel	Phd	Nanomaterials	physics	Osama Abdul aziz Dakhil	professor
	angel	Phd	Materials Science	physics	Wafaa Mahdi Saleh	professor
	angel	Phd	Thin Film	physics	Muslim Ezzedine Abd	professor
	angel	Phd	Thin Film	physics	Ihsan Salah Hassan Ali	Assistant Professor

	angel	Phd	Photovoltaic	physics	Suad Hadi Hamza	Assistant Professor
	angel	Phd	Digital Image Processing	physics	Faten Ezzat Mohieldin	Assistant Professor
	angel	Phd	Optoelectronics	physics	Elham Jassim Mohammed	Assistant Professor
	angel	Phd	Molecular Physics	physics	Walid Salah Abd El , Wahab	Assistant Professor
	angel	Phd	Theoretical physics	physics	Mezher Baqir Saleh	Assistant Professor
	angel	Phd	Theoretical physics	physics	Abd El , Halim Khudair	Assistant Professor
	angel	Phd	Nuclear physics	physics	Etab Fadel Hussein	Assistant Professor
	angel	Phd	Nuclear/Radiation Physics	physics	Muhannad Hatem Hashem	Assistant Professor
	angel	Phd	Nanomaterials	physics	Ahmed Shukr Al , Haddad	Assistant Professor
	angel	Phd	Nanoelectronics	physics	Emad Hamid Hussein	Assistant Professor
	angel	Phd	Photovoltaic	physics	Haidar Jawad Muhammad	Assistant Professor
	angel	Phd	mathematics	mathematics	Hassan Abdul rahman Salman	Assistant Professor
	angel	Phd	Molecular Physics	physics	Esraa Fakher Khalaf	Assistant Professor
	angel	Phd	Optoelectronics	physics	Uday Mazen Abd El , Moneim	Assistant Professor
	angel	Phd	Photonics	physics	Abbas Kamal Hassan Albarzanji	Assistant Professor
	angel	Phd	Solid/Medical Applications	physics	Huda Muhammad Jawad	Assistant Professor
	angel	Phd	Digital Image Processing	physics	Ahlam Muhammad Kazem	Assistant Professor
	angel	Phd	Plasma Physics	physics	Rafid Abbas Ali	Assistant Professor
	angel	Phd	Nanomaterials	physics	Asaad Mejbel Abbas	Assistant Professor

	angel	Phd	Molecular Physics	physics	Hanan Odeh Nayef	Assistant Professor
	angel	Phd	Plasma	physics	Raghad Saadoun Mohammed	Assistant Professor
	angel	Phd	Optics	physics	Mohammed Jassim Mohammed	Assistant Professor
	angel	Phd	Molecular Physics	physics	Asma Sattar Giad Muhaisen	Assistant Professor
	angel	Phd	Thin Film	physics	Sahar Issa Saeed	Assistant Professor
	angel	Phd	Theoretical physics	physics	Enaam Hatem Khudair	teacher
	angel	Phd	laser	physics	Baida Khalifa Hamad	teacher
	angel	Phd	Molecular Spectroscopy	physics	Ruba Taha Salem	teacher
	angel	Phd	Optics / Laser	physics	Murtaza Fayez Sultan	teacher
	angel	Phd	Medical radiation	physics	Hanaa Saleh	Assistant Professor
	angel	Phd	Theoretical physics	physics	Faten Sajit Matar	Assistant Professor
	angel	Phd	Optics	physics	Zainab Rahim Hussain	Assistant Professor
	angel	Phd	Laser	physics	Faten Hamid Mohammed	Assistant Professor
	angel	Phd	Material and plasma applications	physics	Shaimaa Hussein Abd Musallam	teacher
	angel	Phd	Solid Electronics	physics	Jassim Shamkhi	teacher
	angel	Phd	Arabic Language	Arabic Language	Mays Adnan Abdul rasool	teacher
	angel	Phd	Fiber Optic	physics	Miami Abdul latif Muhammad	teacher
	angel	Phd	Nuclear physics	physics	Doaa Abd Salim	teacher
	angel	Phd	laser	physics	Bahaa Jawad Alwan	Assistant Professor

	angel	Phd	Atomic physics	physics	Saif Mohammed Abdullah Hussein	teacher
	angel	Phd	astronomy	physics	Nizar Abdul mahdi Jaber Alwasiti	Assistant Professor
	angel	Master	Thin Film	physics	Huda Jaber Ali	teacher
	angel	Master	Physics of Materials	physics	Farah Jawad Kazim	Assistant Professor
	angel	Master	Optics	physics	Maysam Tariq Sadek	teacher
	angel	Master	Image processing	physics	Ali Jassim Mohammed Ali	Assistant Professor
	angel	Master	Quantum optics	physics	Saad Khalid Rahi	Assistant Professor
	angel	Master	Nuclear physics	physics	Rana Uday Abd El , Jalil	Assistant Professor
	angel	Master	laser	physics	Haidar Abdullah Kazim	Assistant Professor
	angel	Master	Laser Physics	physics	Asma Diaa Nassif	Assistant Professor
	angel	Phd	Electromagnetic	physics	Lama Yassin Abbas	Assistant Professor
	angel	Master	Materials Science	physics	Safaa Farhoud Madloul	Assistant Professor
	angel	Master	Solid State Physics	physics	Lamia Ali Latif	Assistant Professor
	angel	Master	Math	Math	Raghad Abdullah Al , Qadir	Assistant Professor
	angel	Master	Laser Physics	physics	Hala Fakher Dagher	teacher
	angel	Master	Spectroscopy and laser	physics	Haitham Mouloud Mikhlif	teacher
	angel	Master	Atomic theory	physics	Sahar Abdul aziz Muhammad	Assistant Professor
	angel	Master	Nuclear physics	physics	Huda Talal Suleiman	teacher
	angel	Master	nuclear	physics	Donia Fadel Talab	teacher

	angel	Master	Solid State / Thin Film	physics	Ali Muhammad Jabbar	teacher
	angel	Master	Atomic physics	physics	Rawaa Yassin Taha	teacher
	angel	Master	Solid State / Thin Film	physics	Nidal Ali Hussein	teacher
	angel	Master	Atomic physics	physics	Zainab Shaker Nasser	teacher
	angel	Master	Physics of Materials	physics	Reem Sami Ali	teacher
	angel	Master	Steel / Polymer	physics	Sorour Nouri Ismail	teacher
	angel	Master	Medical Physics	physics	Zainab Hamza Baqi	teacher
	angel	Master	Remote sensing	physics	Emad Hamid Ahmed	teacher
	angel	Master	Approximation theory	physics	Meeting Abdul Karim Hussein	teacher
	angel	Master	laser	physics	Adnan Khalid Hassan	Assistant Lecturer
	angel	Master	Digital Image Processing	physics	Firas Sabah Abdul amir	Assistant Lecturer
	angel	Master	Physics of Materials	physics	Lamia Mohammed Raouf	teacher
	angel	Master	Theoretical physics	physics	Bushra Khammas Abbas	teacher
	angel	Master	Atomic physics	physics	Ishraq Ahmed Shaker	teacher
	angel	Master	Self-defense	physics	Zahra Sabah Rashid	teacher
	angel	Master	Solid State Physics	physics	Ronak Abdul salam Abdul karim	Assistant Lecturer
	angel	Master	Laser & Optics	physics	Farouk Khaled Shaker	teacher
	angel	Master	Biological physics	physics	Nizar Khalaf Mohan	teacher
	angel	Master	English novel	physics	Nawal Hamdan Mahmoud	teacher

	angel	Master	Optics	physics	Shaima Hassan Kafi	teacher
	angel	Master	Laser - Electro-Optics	physics	Montazer Jawad Khudair	teacher
	angel	Master	Remote Analysis / Sensing	physics	Mohammed Mitab Jassim	teacher
	angel	Master	Technological knowledge	physics	Asma Mohamed Nasser	teacher
	angel	Master	Laser & Optics	physics	Mohammad Jawad Kazem	teacher
	angel	Master	Electrooptics	physics	Asma Abdul sattar Abdul razzaq	teacher
	angel	Master	Medical Physics	physics	Wahb Bassem Mahdi	teacher
	angel	Master	Materials Science	physics	Zainab Kazem Hamza	Assistant Lecturer
	angel	Master	Optics	physics	Nour Wissam Sabri	Assistant Lecturer
	angel	Master	Materials Science	physics	Salwa Karim Dawood	Assistant Lecturer
	angel	Master	Materials Science	physics	Kazal Muhammad Qadir	Assistant Lecturer
	angel	Master	Materials Science	physics	Sally Yacoub Taher	Assistant Lecturer
	angel	Master	Applied Physics	physics	Nour Uday Abd El , Khaliq	Assistant Lecturer
	angel	Master	Materials Science	physics	Nisreen Khaled Fahad	Assistant Lecturer
	angel	Master	Materials Science	physics	Rania Raad Kazem	Assistant Lecturer
	angel	Master	Thin Film	physics	Farah Abdul razzaq Jassim	Assistant Lecturer
	angel	Master	Medical Physics	physics	Mustafa Younis Ali	Assistant Lecturer
	angel	Master	physics	physics	Sahar Muhammad Ali	Assistant Lecturer
	angel	Master	Materials Science	physics	Lara Adnan Kazim	Assistant Lecturer

	angel	Master	Materials Science	physics	Hatem Naseef's gift	Assistant Lecturer
	angel	Master	Materials Science	physics	Batool Zaki Fahim	Assistant Lecturer
	angel	Master	Materials Science	physics	Hala Adnan Ahmed	Assistant Lecturer
	angel	Phd	Materials Science	physics	Haneen Ali Jassim	Assistant Lecturer
	angel	Master	Solid State Physics	physics	Duha Abdul karim Kazem	Assistant Lecturer
	angel	Master	Media / PR	physics	Zahraa Hossam Eddin Ibrahim	Assistant Lecturer
	angel	Master	Nanomaterials	physics	Ihab Adnan Thabet	Assistant Lecturer
	angel	Master	Nuclear physics	physics	Hadeel Ghali Ashnayin	Assistant Lecturer
	angel	Master	Laser & Optoelectronics	physics	Marwa Abdul rahman Dawood	Assistant Lecturer
	angel	Master	Laser and Molecular	physics	Surat Yasin Khalaf	Assistant Lecturer

Professional Development

Mentoring new faculty members

Follow the program accurately.
Ask many assignments that require external information.

Professional development of faculty members

Increasing practical discussions and continuing to follow the latest scientific research or good knowledge of the importance of how to conduct practical experiments.

11. Acceptance Criterion

Admission is central (ministerial) and depends on the rate of students and the rate of admission to the college in that year, where our department occupies the second place in admission for the college, as the newly admitted students are subject to an oral interview to indicate the extent of their desire to join our department in order to organize statistics for the department.

12. The most important sources of information about the program

1- Methodological books approved by the Scientific Committee Committee in the department and the committees of the faculties of science.
2 - Auxiliary books.
3. Books and enrichment sources / sources in English.
4. Additional sources from the Internet.

Program Skills Outline

Learning outcomes required from the program															
Values				Skills				Knowledge				Basic or optional	Course Name	Course Code	Level
C 4	C 3	C 2	C 1	B 4	B 3	B 2	B 1	A 4	A 3	A 2	A 1				
	√	√	√		√	√			√		√	Department Requirements	Mechanics and properties of a substance	50821111	First stage 2024-2025
	√	√	√		√	√			√		√	Department Requirements	Electrical & Magnetic	50821122	
	√	√	√		√	√			√		√	Department Requirements	mathematics	50821113	
	√	√	√		√	√			√		√	Department Requirements	Calculators	5086452	
	√	√	√		√	√			√		√	Department Requirements	General astronomy	5000120	
	√	√	√		√	√			√		√	College Requirements	Human Rights	5082111	
	√	√	√		√	√			√		√	University Requirements	Arabic language	5082112	
	√	√	√		√	√			√		√	Department Requirements	Modern physics	5081310	Second stage 2024-2025
	√	√	√		√	√			√		√	Department Requirements	Thermodynamic heat	5081355	
	√	√	√		√	√			√		√	Department	Analytical Mechanics	5082265	

											Requirements			
	√	√	√		√	√			√		√	Department Requirements	Analogue electronics	5081220	
	√	√	√		√	√			√		√	Department Requirements	Math	5000164	
	√	√	√		√	√			√		√	College Requirements	English language	5081225	
	√	√	√		√	√			√		√	College Requirements	Computers	5000164	
	√	√	√		√	√			√		√	Department Requirements	Sound and wave motion	5086452	
	√	√	√		√	√			√		√	Department Requirements	Optics	50821303	**Third stage** 2024-2025
	√	√	√		√	√			√		√	Department Requirements	Laser Physics	5081325	
	√	√	√		√	√			√		√	Department Requirements	Quantitative Mechanics	5081460	
	√	√	√		√	√			√		√	Department Requirements	Physics of Materials	5081355	
	√	√	√		√	√			√		√	Department Requirements	Numerical analysis	5082265	
	√	√	√		√	√			√		√	College Requirements	English	5082130	
	√	√	√		√	√			√		√	Department Requirements	Molecular physics	5081317	

	√	√	√		√	√			√		√	Department Requirements	Spectra	5083214	
	√	√	√		√	√			√		√	Department Requirements	Nuclear physics	5081470	**Fourth stage** 2024-2025
	√	√	√		√	√			√		√	Department Requirements	Solid State Physics	5081465	
	√	√	√		√	√			√		√	Department Requirements	Electromagnetic theory	5081330	
	√	√	√		√	√			√		√	Department Requirements	Mathematical Physics	50821214	
	√	√	√		√	√			√		√	Department Requirements	Nanoscience	50821306	
	√	√	√		√	√			√		√	Department Requirements	Plasma Physics	50821306	
	√	√	√		√	√			√		√	Department Requirements	Biophysics	50821305	
	√	√	√		√	√			√		√	Department Requirements	Research Project	but	

13. Program Development Plan
1- Using electronic devices to display information

Third stage

1. Course Name
Optics
2. Course Code
5081215
3. Semester/Year
2023-2024
4. Date of preparation of this description
6/4/2024
5. Available attendance formats
Came
6. Number of Credit Hours (Total)/ Number of Units
30
7. Course administrator's name (if more than one name)
Murtaza Faiz Sultan
8. Course Objectives

Knowledge and understanding
1 Understanding and understanding of the material in relation to the required vocabulary (programmed)
2 Power Point.
3 Use the ball and pen.
4 Preparation of illustrative means.

Subject-specific skills
1 Means of illustration.
2 Too many examples.
3 Solve exercises from the book.

Thinking skills
1 Ask questions about.
Topics that are debatable by students in the classrooms.
2 Ask questions that the student solves for the classroom.
3- Conducting daily quick exams with intellectual questions.
4- Conducting a brief reports seminar involving two or more students to study a topic related to the vocabulary of the curriculum.

At the end of the courses, students are expected to learn:
Physical optics plays an important role in scientific research related to the study of the structural and physical properti of matter, as well as in communications and medicine. This subject aims to provide students with the basic concepts needed to enable them to successfully apply optics in their real lives. Subject preview covers and
Introduction to Engineering Optics and Wave Optics. The topic is devoted to discussion in:
1. Wave nature; the wave is partially transmitted and partially reflected
at the boundary between two mediums in which their velocity differs. It's not particularly important to know which equation determines which part moves (and therefore breaks), but there are important techniques
Like optical fibers, it depends on the fact that this fraction becomes zero relative to angles inclined enough. This phenomenon is called total internal reflection. And it happens when there is no angle that satisfies Snell's law.
2. The concept of the wave equation and how to solve it using harmonic waves, some examples of waves, mathematic representation of traveling waves and real light waves
. 3. Maxwell's equations and their solutions to harmonic waves and the physical significance of Maxwell's equations.

4. Interference, diffraction, polarization of light, types and applications.
5. Expressions of cohesion length and cohesion time for
Light wave and derive an expression for the coherence length of a wave train that has bandwidth.
6. Solve the power of optical devices.

9. Teaching and Learning Strategies

Develop a plan to ask questions, develop questions and ask daily rapid exams Periodic visits to all lessons of the stages Fill out a form - visit and submit it to the competent committee Department

10.Course Structure

Evaluation method	Learning method	Unit or subject name	Required Learning Outcomes	Hours	Week
Questions & Discussion	theoretical	**Introduction to Optic**	Introduction to Optic	2	1
Questions & Discussion	theoretical	**Nature of light**	Nature of Light	2	2
Questions & Discussion	theoretical	**Reflection and refracti**	Reflection and Refracti	2	3
Questions & Discussion	theoretical	**Engineering Optics**	Geometric Optics	2	4
Questions & Discussion	theoretical	**Mirrors**	Mirrors	2	5
Questions & Discussion	theoretical	**Lenses**	Lenses	2	6

Questions & Discussion	theoretical	**Optical devices**	Optical Devices	2	7
Questions & Discussion	theoretical	**Diffraction and interference**	Diffraction and Interfere	2	8
Questions & Discussion	theoretical	**Polarization**	Polarization	2	9
Questions & Discussion	theoretical	**Spectra of Optics**	Optical Spectra	2	10
Questions & Discussion	theoretical	**Optical Fiber**	Optical Fibers	2	11
Questions & Discussion	theoretical	**The propagation of lig in different media**	Propagation of Light i Different Media	2	12
Questions & Discussion	theoretical	**Thin-film interferenc**	Interference in Thin Fil	2	13
Questions & Discussion	theoretical	**The phenomenon of lig scattering**	The Phenomenon of Li Scattering	2	14

Questions & Discussion	theoretical	**Modern optics**	Modern Optics	2	15

11.Course Evaluation

The grade out of 100 is distributed according to the tasks assigned to the student such as daily preparation and daily, oral and monthly exams
Editorial and reports.... etc

12.Learning and Teaching Resources

1. "Optics" – Eugene Hecht 2. "Introduction to Modern Optics" – Gra R. Fowles 3. "Fundamentals of Photonics" – Bahaa I A. Saleh & Malvin Carl Teich 4. "Principles of Optics" – Max Born & Emil Wolf 5. "Optical Physics" – Ariel Lipson, Stephen G. Lipson, & Henry Lipson	Required textbooks (methodology, if any)
	Key references (sources)
	Recommended books and references) Domains
	Scientific, Reports..... (

1. Course Name
Laser Physics
2. Course Code
5081325
3. Semester/Year
2023-2024
4. Date of preparation of this description
6/4/2024
5. Available attendance formats
Came
6. Number of Credit Hours (Total)/ Number of Units
30
7. Course administrator's name (if more than one name)
Ruba Taha Salem
8. Course Objectives

Knowledge and understanding 1 Comprehend and understand the material in relation t the required vocabulary (programmed. (2 Power Point. 3 Use the ball and pen. 4 Preparation of illustrative means. Subject-specific skills 1 Means of illustration. 2 Too many examples. 3 Solve exercises from the book. Thinking skills 1 Ask questions about. Topics that are debatable by students in the classrooms. 2 Ask questions that the student solves for the classroo 3- Conducting daily quick exams with intellectual questions. 4- Conducting a brief reports seminar involving two or more students to study a topic related to the vocabulary the curriculum. At the end of the courses, students are expected to learn This resource contains demonstrations that are used to illustrate the theory and applications of lasers and optic Detailed list of Topics can be found below. Lasers are used today	

in an ever-increasing number of applications. There is hardly a field untouched by the laser. Laser operation switch Roles in the home, office, hospital, factory, outdoor and theater, as well as in the laboratory. To identify lasers a related optics, one Usually he takes one or two topics or gets the necessary information from books and newspaper articles. To ma this learning more vivid, exciting, and more understandable, hopefully, one needs to see some of the fundamental phenomena involved. To fill this need, Pro Ezekiel filmed 48 video presentations, most of which illustrate Basic phenomena related to lasers and physical optics. Using split-screen inserts and a wide range of video recording capabilities, it is possible to show real-time effects in lasers and optics with simultaneous processin of components that cause These effects. This way, one can see the effects in close ups It will be difficult, if not impossible, to present it to the attendees or the classroom.	

9. Teaching and Learning Strategies

Develop a plan to ask questions, develop questions and ask daily rapid exams Periodic visits to all lessons of the stages Fill out a form - visit and submit it to the competent committee Department	

10.Course Structure

Evaluation method	Learning method	Unit or subject name	Required Learning Outcomes	Hours	Week
Questions & Discussion	theoretical	**Introduction to Lase**	Introduction to Laser	2	1
Questions & Discussion	theoretical	**Physical foundations laser action**	Physical Basics of Las Operation	2	2
Questions & Discussion	theoretical	**Conditions for obtaini a laser**	Requirements for Obtai a Laser	2	3

Questions & Discussion	theoretical	**Types of lasers**	Types of Lasers	2	4
Questions & Discussion	theoretical	**Laser Device Infrastructure**	Basic Structure of the L Device	2	5
Questions & Discussion	theoretical	**Properties of laser bea**	Properties of Laser Ra	2	6
Questions & Discussion	theoretical	**Laser applications ir medicine**	Laser Applications ir Medicine	2	7
Questions & Discussion	theoretical	**Laser applications ir communications**	Laser Applications ir Communications	2	8
Questions & Discussion	theoretical	**Catalytic emission physics**	Stimulated Emission Physics	2	9
Questions & Discussion	theoretical	**Lasers in industry**	Lasers in Industry	2	10
Questions & Discussion	theoretical	**Safety in laser use**	Laser Safety	2	11

Questions & Discussion	theoretical	**Laser measurements**	Laser Measurements	2	12
Questions & Discussion	theoretical	**Lasers in fundamenta physics**	Lasers in Basic Physic	2	13
Questions & Discussion	theoretical	**Laser spectroscopy**	Laser Spectroscopy	2	14
Questions & Discussion	theoretical	**Laser & Nanotechnolo**	Lasers and Nanotechnol	2	15

11.Course Evaluation

The grade out of 100 is distributed according to the tasks assigned to the student such as daily preparation and daily, oral and monthly exams
Editorial and reports.... etc

12.Learning and Teaching Resources

1. "Lasers" – Anthony E. Siegman 2. "Laser Physics" – Peter W. Milonni & Joseph H. Eberly 3. "Principles of Lasers" – Orazio Svelto 4. "Introduction to Quantum Mechanics with Applications to Laser Physics" – Anthony Mark Fox 5. "Laser Fundamentals" – William T. Silfvast	Required textbooks (methodology, if any)
	Key references (sources)
	Recommended books and references) Domains
	Scientific, Reports..... (

1. Course Name
Quantum Mickey
2. Course Code
5081460
3. Semester/Year
2025-2024
4. Date of preparation of this description
6/4/2025
5. Available attendance formats
Came
6. Number of Credit Hours (Total)/ Number of Units
30
7. Course administrator's name (if more than one name)
Abbas Kamal Albarzanji
8. Course Objectives
The Quantum Mechanics course aims to provide the student with a solid theoretical foundation for understanding the behavior of fine particles, by studying basic concepts such as the wave function the Schrödinger equation, and the uncertainty principle. The student also learns how to deal with quantum systems, analyze related and discrete states, and use mathematical effects. The course develops analytical and abstract thinking skills, and prepares the student for the applications of modern physics and advanced quantum techniques.
9. Teaching and Learning Strategies
The teaching of quantitative mechanics is based on the progressive explanation of abstract concepts using mathematical demonstrations and equations, with an emphasis on logical and abstract deduction. Education integrates theoretical lectures with classroom activities, such as complex problem analysis and scientific debate. Software and quantitative simulations are used to deepen understanding, encourage students to actively participate, ask questions and apply concepts in real-life examples. In learning quantitative mechanics, the student relies on deep understanding rather than memorization, by reviewing lectures, solving exercises, and collaborating with colleagues in study groups. Additional sources and reference books are used to broaden perceptions, with a focus on linking theory to practical applications. It also encourages the student to use simulations and interactive models to understand quantum behavior and develop analytical abilities.

10. Course Structure					
Evaluation method	Learning method	Unit or subject name	Required Learning Outcomes	Hours	Week
Questions & Discussion	theoretical	Introduction to Quantum Mechanics	Introduction to Quantum Mechanics	2	1
Questions & Discussion	theoretical	Double Slit Experience	Double-Slit Experiment	2	2
Questions & Discussion	theoretical	Probability theory in quantum mechanics	Probability Theory in Quantum Mechanics	2	3
Questions & Discussion	theoretical	Wave function and its interpretation	Wave Function and its Interpretation	2	4
Questions & Discussion	theoretical	Schrödinger equation	Schrödinger Equation	2	5
Questions &	theoretical	Heisenberg's uncertainty principle	Heisenberg Uncertainty Principle	2	6

Discussion					
Questions & Discussion	theoretical	Influences and Eigen-Calculation	Operators and Eigenvalue Calculations	2	7
Questions & Discussion	theoretical	Wave functions of a particle in a box	Particle in a Box Wavefunctions	2	8
Questions & Discussion	theoretical	Particle in a well of potential	Particle in a Potential Well	2	9
Questions & Discussion	theoretical	Multi-particle systems	Multi-Particle Systems	2	10
Questions & Discussion	theoretical	Fusiform winding	Spin and Pauli Principle	2	11
Questions &	theoretical	Quantum measurement theory	Quantum Measurement Theory	2	12

Discussion					
Questions & Discussion	theoretical	Atomic structure by quantity	Atomic Structure in Quantum Terms	2	13
Questions & Discussion	theoretical	Overlay of cases and entanglements	Superposition and Entanglement	2	14
Questions & Discussion	theoretical	Quantum Mechanics Applications	Applications of Quantum Mechanics	2	15

11. Course Evaluation

As		Time/Number	Weight (Marks)	Week Due	Relevar
Formative assessment	**Quizzes**	2	10% (10)	5 and 10	
	Assignments	2	10% (10)	2 and 12	
	Projects / Lab.	1	10% (10)	Continuous	
	Report	1	10% (10)	13	
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	
	Final Exam	3 hr	50% (50)	16	
	Total assessment		100% (100 marks)		

12. Learning and Teaching Resources

1. *Introduction to Quantum Mechanics*, 2nd Edition – A widely used undergraduate textbook known for its clarity and foundational approach.
2. *Modern Quantum Mechanics*, 2nd Edition– A more advanced text that

bridges conceptual foundations with rigorous mathematical treatment.	
MIT Open Courseware – Quantum Physics Ihttps://www.khanacademy.org/science/physics/quantum-physics	Key references (sources) Recommended books and references) Domains Scientific, Reports..... (

1. Course Name
Physics of Materials
1. Course Code
5081355
2. Semester/Year
2025-2024
3. Date of preparation of this description
6/4/2024
4. Available attendance formats
Came
5. Number of Credit Hours (Total)/ Number of Units
30
6. Course administrator's name (if more than one name)
Walid Salah Abd El , Wahab
7. Course Objectives
This course aims to provide the student with a comprehensive understanding of the atomic and crystal structure of materials, the relationships that govern chemical bonds between atoms, and the effect of these bonds on physical, electrical, thermal and optical properties. The student is introduc to the concepts of electrical conduction, crystal regularity, and the transition of atoms, in addition t studying crystalline defects and their impact on the behavior of matter. He also acquires knowledg about insulating materials, their magnetic and optical properties, elasticity, plasticity and phase changes. The course links the theoretical foundation with practical applications in materials scienc

preparing the student for a deeper understanding of the design and development of materials in the fields of physics and modern technologies.

8. Teaching and Learning Strategies

Teaching is based on interactive lectures supported by visual aids and crystalline models, linking theories to practical applications. Presentations, material comparisons, and demonstration experiments are used to enhance understanding. Scientific discussion, case analysis, and questioning are encouraged to stimulate students' critical thinking.
Learning is based on understanding concepts through self-study, doing exercises, and working in collaborative groups. Students use electronic resources and explanatory videos to understand the structures and properties of materials. They are motivated to submit short reports and applied projects that link theory to practical use in materials science and technology.

9. Course Structure

Evaluation method	Learning method	Unit or subject name	Required Learning Outcomes	Hours	Week
Questions & Discussion	theoretical	Atomic structure of materia	Atomic structure of materials	2	1
Questions & Discussion	theoretical	Chemical bonds Between atoms	Chemical bonds betwe atoms	2	2
Questions & Discussion	theoretical	Crystal structure of materia Solid	Crystal structure of solids	2	3
Questions & Discussion	theoretical	Crystalline defects in materi	Crystalline defects in materials	2	4
Questions & Discussion	theoretical	Electrical conductivity of materials	Electrical conductivity of materi	2	5

Questions & Discussion	theoretical	Unit Cells	Unit cells	2	6
Questions & Discussion	theoretical	Free energy and regularity Crystal	Free energy and crystalline order	2	7
Questions & Discussion	theoretical	Material properties Magnetism	Magnetic properties of materials	2	8
Questions & Discussion	theoretical	Thermal conductivity	Thermal conductivity	2	9
Questions & Discussion	theoretical	Properties of optical materi	Optical properties of materials	2	10
Questions & Discussion	theoretical	Insulating materials (Dielectrics)	Dielectrics	2	11
Questions & Discussion	theoretical	Diffusion of atoms in materi	Atomic Diffusion in materials	2	12
Questions & Discussion	theoretical	Flexibility and plasticity	Elasticity and plasticity	2	13

Questions & Discussion	theoretical	Phase changes in materials	Phase changes in materials	2	14
Questions & Discussion	theoretical	Physical applications of materials	Physical applications of materia	2	15

10.Course Evaluation

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

11.Learning and Teaching Resources

Here are the top five sources for studying materials science: 1. "Materials Science and Engineering: A Introduction" – William D. Callister & David G. Rethwisch 2. "Fundamentals of Materials Science an Engineering" – William D. Callister 3. "The Science and Engineering of Materials" – Donald R. Askeland & Wendelin J. Wright 4. "Introduction to Materials Science for Engineers" – James F. Shackelford 5. "Principles of Materials Science and Engineering" – William F. Smith & Javac Hashemi	Required textbooks (methodology, if any)
	Key references (sources)
	Recommended books and references) Domains
	Scientific, Reports..... (

1. Course Name
Numerical analysis
2. Course Code
5082265
3. Semester/Year
2023-2024
4. Date of preparation of this description
6/4/2024
5. Available attendance formats
Came
6. Number of Credit Hours (Total)/ Number of Units
20
7. Course administrator's name (if more than one name)
Hazem Kata Dawai
8. Course Objectives
This course aims to provide the student with a strong foundation in the concepts of numerical analysis and its applications in solving scientific and engineering problems. The student is introduced to numerical approximation methods, error calculation, methods of solving linear and nonlinear equations, numerical integration, numerical derivatives, as well as solving ordinary differential equations using numerical methods. The course also analyzes the performance of numerical methods in terms of accuracy, efficiency and stability. The course focuses on linking the theoretical and programmatic aspect, using mathematical software to apply concepts, which gives the student practica skills in building numerical solutions to realistic problems in multiple fields such as engineering, physics and compute science.
9. Teaching and Learning Strategies
Develop a plan to ask questions, develop questions and ask daily rapid exams Periodic visits to all lessons of the stages Fill out a form - visit and submit it to the competent committee Department

10.Course Structure

Evaluation method	Learning method	Unit or subject name	Required Learning Outcomes	Hours	Week
Questions & Discussion	theoretical	Introduction to Numerical Analysis and its importance in physi	Introduction to numeri analysis and its importance in physics	2	1
Questions & Discussion	theoretical	Numerical methods for solvi Algebraic equations	Numerical methods fo solving algebraic equati	2	2

Questions & Discussion	theoretical	Newton-Raphson's method solving Equations	Newton-Raphson method for solving equations	2	3
Questions & Discussion	theoretical	Finite spreads methods	Finite Difference methods	2	4
Questions & Discussion	theoretical	Approximation and mathematical guessing	Approximation and mathematical estimation	2	5
Questions & Discussion	theoretical	Numerical integration meth (e.g. trapezoidal method)	Numerical integration methods (such as the trapezoidal method)	2	6
Questions & Discussion	theoretical	Numerical differentiation methods	Numerical differentiati methods	2	7
Questions & Discussion	theoretical	Solving Differential Equatic Using numerical methods	Solving Differential equations using numer methods	2	8
Questions & Discussion	theoretical	Binary division methods (Bisection Method)	Bisection methods	2	9
Questions & Discussion	theoretical	Rounding Functions Using Polynomials	Approximation of functions using Polynomials	2	10

Questions & Discussion	theoretical	Error in numerical calculatic and methods of estimating	Error in Numerical calculations and metho for estimating it	2	11
Questions & Discussion	theoretical	Fixed point method	Fixed point method	2	12
Questions & Discussion	theoretical	Numerical integration usin Simpson method	Numerical Integration using Simpson's meth	2	13
Questions & Discussion	theoretical	Methods for solving systems equations Linear (e.g. Gauss's method)	Methods for solving systems of linear equations (such as the Gauss method)	2	14
Questions & Discussion	theoretical	Physical applications of roa Numerical	Physical applications of numeri methods	2	15

11.Course Evaluation

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

12.Learning and Teaching Resources

Required textbooks (methodology, if any)
1. "Numerical Analysis" – Richard L. Burden & J. Douglas Faires 2. "An Introduction to Numerical Analysi – Kendall E. Atkinson 3. "Numerical Methods for Engineers" – Steven C. Chapra & Raymond P. Canale

4. "Applied Numerical Analysis" – Curtis Gerald & Patrick O. Wheatley 5. "Introduction to Numerical Methods an Analysis" – James F. Epperson	
	Key references (sources)
	Recommended books and references) Domains
	Scientific, Reports..... (

Fourth stage

1. Course Name
Nuclear
2. Course Code
5081470
3. Semester/Year
2025-2024
4. Date of preparation of this description
6/4/2025
5. Available attendance formats
Came
6. Number of Credit Hours (Total)/ Number of Units
30
7. Course administrator's name (if more than one name)
Hanaa Saleh Saba Khamis
8. Course Objectives
This educational program aims to provide the student with a solid scientific foundation in the concepts of nuclear physics, starting from the structure of the nucleus and nuclear models, through the understanding of nuclear reactions, radioactive decay, and neutron interactions. The student learns about the uses of nuclear energy in reactors and weapons, and the basic principles of nuclea fusion and isotopic applications. The program also includes astronuclear physics and experimental aspects, linking theory to practical application. The course attaches special importance to the subje of nuclear safety, which gives the student a scientific and professional awareness about the safe an responsible use of nuclear energy, and prepares him for further specialization or research in this vi field.
9. Teaching and Learning Strategies
Teaching is based on theoretical lectures supported by illustrations, presentations, and virtual or laboratory experiments, to facilitate understanding of nuclear reactions and nucleus components. Mathematical comparisons and models are used to explain abstract concepts, while motivating students to discuss, ask questions, and relate content to real-world uses of nuclear energy. Learning focuses on understanding basic principles through self-study, problem solving, and analysis of nuclear reactions using mathematical models. Students are encouraged to use digital resources, attend interactive lectures, and work in teams to present selected topics. They are also motivated to link nuclear concepts to their practical, medical and industrial applications.
10.Course Structure

Evaluation method	Learning method	Unit or subject name	Required Learning Outcomes	Hours	Week
Questions & Discussion	theoretical	Introduction to Nuclear Phys	Introduction to Nuclear Physics	2	1

Questions & Discussion	theoretical	Installation of the kernel	Nuclear Structure	2	2
Questions & Discussion	theoretical	Nuclear models	Nuclear Models	2	3
Questions & Discussion	theoretical	Nuclear Energy	Nuclear Energy	2	4
Questions & Discussion	theoretical	Nuclear reactions	Nuclear Reactions	2	5
Questions & Discussion	theoretical	Nuclear radiation	Nuclear Radiation	2	6
Questions & Discussion	theoretical	Radioactive decay	Radioactive Decay	2	7
Questions & Discussion	theoretical	Neutron Interactions	Neutron Reactions	2	8
Questions & Discussion	theoretical	Experimental nuclear physi	Experimental Nuclear Physics	2	9

Questions & Discussion	theoretical	Nuclear reactions In power reactors	Nuclear Reactions in Power Reactors	2	10
Questions & Discussion	theoretical	Nuclear reactions In nuclear weapons	Nuclear Reactions in Nuclear Weapons	2	11
Questions & Discussion	theoretical	Nuclear fusion	Nuclear Fusion	2	12
Questions & Discussion	theoretical	Nuclear isotopes and their applications	Nuclear Isotopes and Their Applications	2	13
Questions & Discussion	theoretical	Astronuclear physics	Nuclear Astrophysics	2	14
Questions & Discussion	theoretical	Nuclear safety	Nuclear Safety	2	15

11.Course Evaluation

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

12.Learning and Teaching Resources

	Required textbooks (methodology, if any)

1. Introductory Nuclear Physics" – Kenne S. Krane 2. The Physics of Nuclear Reactions" – Sergei Flügge 3. Nuclear Physics: Principles and Applications" – John Lilley	
1. Nuclear Physics: A Very Short Introduction" – Frank Close 2. Introduction to Nuclear Engineering" – John R. Lamarsh & Anthony J. Baratta	Key references (sources) Recommended books and references) Domains Scientific, Reports..... (

1. Course Name
Solid State Physics
2. Course Code
5081465
3. Semester/Year
2025-2024
4. Date of preparation of this description
6/4/2025
5. Available attendance formats
Came
6. Number of Credit Hours (Total)/ Number of Units
30
7. Course administrator's name (if more than one name)
Wissam Jaafar Aziz
8. Course Objectives
The Solid State Physics program aims to provide the student with a comprehensive scientific foundation on the physical properties of solids, ranging from crystal structure and network dynami to electrical, optical, and magnetic properties. The student learns the principles of bar theory and t role of free electrons and voids in determining the behavior of materials, as well as understanding crystalline defects and their impact. The course includes the study of semiconductor materials, electrochemical processes, and materials analysis techniques, with a focus on practical application in the electronic and magnetic industries. The program aims to develop the student's abilities to analyze and understand the microstructure and its relationship to the properties of materials, which qualifies him for the fields of research or industrial application.
9. Teaching and Learning Strategies

Teaching is based on theoretical explanation supported by practical examples and illustrations of crystal structure and concepts associated with physical properties. Presentations, demonstrations, and simulation software are used to bring abstract ideas closer. Students encourage dialogue and discussion in the classroom, and are assigned short reports linking theory to industrial or technical practice.

Student learning is based on actively following lessons, analyzing examples, and working to solve problems related to the physical properties of materials. Stimulates students to self-study and use electronic resources to understand tape theory and the behavior of semiconductor materials. They are also encouraged to carry out scientific presentations and individual or group applied projects to deepen understanding and employ knowledge practically.

10.Course Structure

Evaluation method	Learning method	Unit or subject name	Required Learning Outcomes	Hours	Week
Questions & Discussion	theoretical	Introduction to Solid State Physics	Introduction to State Physic	2	1
Questions & Discussion	theoretical	Crystal structure	Solid State Physics	2	2
Questions & Discussion	theoretical	Optical properties of materi	Crystal Structure	2	3
Questions & Discussion	theoretical	Electrical properties of mater	Optical Properties of Mater	2	4
Questions & Discussion	theoretical	Thermal properties of materi	Electrical Properties of Materials	2	5

Questions & Discussion	theoretical	Crystalline defects	Thermal Properties of Materials	2	6
Questions & Discussion	theoretical	Dynamics of crystal lattice	Crystalline Defects	2	7
Questions & Discussion	theoretical	Tape theory (Band Theory)	Lattice Dynamics	2	8
Questions & Discussion	theoretical	Voids and free electrons	Band Theory	2	9
Questions & Discussion	theoretical	Magnetic properties of mater	Vacuities and Electrons	2	10
Questions & Discussion	theoretical	Semiconductor materials	Semiconductor Materials	2	11
Questions & Discussion	theoretical	Electrochemical processes	Magnetic Properties	2	12
Questions & Discussion	theoretical	Material Analysis Techniqu	of Materials	2	13

Questions & Discussion	theoretical	Solid State Physics Applicati	Semiconductors	2	14
Questions & Discussion	theoretical	Conductivity theory	Electrochemical Processes	2	15

11.Course Evaluation	
12.Learning and Teaching Resources	
1. "Introduction to Solid State Physics" – Charles Kittel 2. "Solid State Physics" – Neil W. Ashcro & N. David Mermin 3. "Principles of Condensed Matter Physics" – Paul M. Chaikin & Tobias C. Lubensky 4. "Condensed Matter Physics" – Michael P. Marder 5. "Solid State Physics: An Introduction" Alan C. Wright	Required textbooks (methodology, if any)
	Key references (sources)
	Recommended books and references) Domains
	Scientific, Reports..... (

1. Course Name
Plasma
2. Course Code
5081485
3. Semester/Year
2023-2024
4. Date of preparation of this description
6/4/2024
5. Available attendance formats
Came

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

30

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

Beida Mohsen Ahmed Abdullah

8. Course Objectives

Knowledge and understanding
1 Comprehend and understand the material in relation t
the required vocabulary (programmed. (
2 Power Point.
3 Use the ball and pen.
4 Preparation of illustrative means.

Subject-specific skills
1 Means of illustration.
2 Too many examples.
3 Solve exercises from the book.

Thinking skills
1 Ask questions about.
Topics that are debatable by students in the classrooms.
2 Ask questions that the student solves for the classroo
3- Conducting daily quick exams with intellectual questions.
4- Conducting a brief reports seminar involving two or more students to study a topic related to the vocabulary the curriculum.
At the end of the courses, students are expected to learn
This topic introduces plasma phenomena related to ene generation by thermonuclear fusion and astrophysics. It will cover basic plasma properties and collective behav Coulomb collisions and transport processes, motion of charged particles in magnetic fields, plasma trapping diagrams, MHD models, simple equilibrium and stabili analysis, difluid hydrodynamic plasma models, wave propagation in a magnetic field. field. The topic also introduces kinetic theory, Vlasov's model of plasma, an the relationship between kinetic models. fluidity, electr plasma waves, and landau damping. The state of plasm dominates the observable universe and is important in fields as diverse as astrophysics and controlled fusion. Plasma is often referred to as the "fourth state of matter This topic presents the study of the nature and behavior plasma. A variety of models are presented to describe t behavior of plasma.

9. Teaching and Learning Strategies

Develop a plan to ask questions, develop questions and ask daily rapid exams Periodic visits to all lessons of the stages Fill out a form - visit and submit it to the competent committee Department

10.Course Structure

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

Questions & Discussion	theoretical	Kernel model	Nuclear Model	2	1
Questions & Discussion	theoretical	Nuclear power	Nuclear Forces	2	2
Questions & Discussion	theoretical	Radioactive decay	Radioactive Decay	2	3
Questions & Discussion	theoretical	Nuclear reactions.	Nuclear Reactions	2	4
Questions & Discussion	theoretical	Nuclear Energy	Nuclear Energy	2	5
Questions & Discussion	theoretical	Nuclear radiation	Nuclear Radiation	2	6
Questions & Discussion	theoretical	Nuclear Physics Applicatio	Applications of Nucle Physics	2	7
Questions & Discussion	theoretical	Interactions in objects Celestial	Reactions in Celestia Bodies	2	8

Questions & Discussion	theoretical	Nuclear physics Experimental	Nuclear Physics	2	9
Questions & Discussion	theoretical	Radionuclides	Experimental	2	10
Questions & Discussion	theoretical	Explore heavy cores	Radionuclides	2	11
Questions & Discussion	theoretical	Physics of nuclear reactors	Exploration of Heavy Nuclei	2	12
Questions & Discussion	theoretical	Radiation effects	Nuclear Reactor Physi	2	13
Questions & Discussion	theoretical	The future in physics Nuclear	Radiation Effects	2	14
Questions & Discussion	theoretical	Kernel model	Future in Physics	2	15

11.Course Evaluation

The grade out of 100 is distributed according to the tasks assigned to the student such as daily preparation and daily, oral and monthly exams
Editorial and reports.... etc

12.Learning and Teaching Resources

1. "Introduction to Plasma Physics and Controlled Fusion" – Francis Chen	Required textbooks (methodology, if any)

2. "Plasma Physics: An Introduction" – Richard Fitzpatrick 3. "Principles of Plasma Discharges and Materials Processing" – Michael A. Lieberman & Allan J. Lichtenberg 4. "Plasma Physics and Fusion Energy" – P. D. H. (Peter) G. (Herman) H. H. (Herman) (Roderick) Jones 5. "Fundamentals of Plasma Physics" – Pa M. Bellan .	
	Key references (sources)
	Recommended books and references) Domains
	Scientific, Reports..... (

1. Course Name
Research Project
2. Course Code
5081460
3. Semester/Year
2023-2024
4. Date of preparation of this description
6/4/2024
5. Available attendance formats
Presence + Practical
6. Number of Credit Hours (Total)/ Number of Units
30
7. Course administrator's name (if more than one name)
8. Course Objectives
The graduation project course in the Department of Physics / College of Science aims to enable the student to employ knowledge and skills acquired during his years of study in addressing an advanced research topic within one of the branches of physics. The course seeks to develop the student's abilities in scientific research, and enhance his skills in scientific analysis and interpretation of physical problems, whether through theoretical, practical or numerical work. T student also gains experience in the use of modern tools and techniques relevant to his field of research, and enhances ability to work independently or in a team, while adhering to the deadlines set for the completion of the project. Throu this course, the student learns how to prepare an integrated scientific report that includes methodology, results and analysis, in addition to the skills of oral presentation and scientific discussion in front of a committee of specialists. Th course also establishes the importance of adhering to the ethics of scientific research, and stimulates critical thinking a innovation in proposing solutions and recommendations, which contributes to preparing the student for future academ or professional stages.
9. Teaching and Learning Strategies
The teaching and learning strategies in the graduation project course are based on directing the student towards self-learning and independent research under the direct supervision of a faculty member. The student is encouraged to choose an appropriate research topic and determine his goals and time plan, which enhances the organization and planning skills. It also uses individual guidance and periodic discussions as a means of supporting the student scientifically and methodologically during the project implementation stages. The course integrates theoretical and applied work, through the accreditation of laboratories and experiments or numerical modeling, depending on the nature of the project. It enhances the student's scientific writing skills through the preparation of a detailed research report, in addition to developing his abilities in communication and scientific presentation during the presentation and discussion of the project before the evaluation committee. The strategy also focuses on building entrepreneurship, responsibility and adherence to standards of integrity and scientific honesty.
10.Course Structure
The course includes two hours of study hours per week for each of the first and second courses, and at the end of each course, the student presents a sumner (a demonstration) of the results reached by ... The degree is divided into 50% for the first semester and 50% for the second semester. The number of course units is two (2) units.

11.Course Evaluation	
12.Learning and Teaching Resources	
	Required textbooks (methodology, if any)
	Key references (sources)
	Recommended books and references) Domains
	Scientific, Reports..... (

Analysis and Linkage between Course Outcomes and the Objectives of the Educational Program Vision for the Physics Department

This report aims to analyze the outcomes of the third and fourth-year physics courses in the Department of Physics and link them to the objectives of the educational program vision, enhancing the integration of the educational process and ensuring its alignment with labor market requirements and scientific developments.
Objectives of the Educational Program Vision:

- 1. Prepare graduates with a strong knowledge base in theoretical and applied physics.
- 2. Develop analytical skills, critical thinking, and problem solving.
- 3. Integrate scientific knowledge with modern technological applications.
- 4. Enhance scientific research skills and the ability to use experimental tools and software.
- 5. Establish the principles of professional ethics and scientific responsibility.
- 6. Prepare students to compete in the labor market or graduate studies.

Analysis:

Course Linkage to Program Vision Objectives

Optics consolidates concepts of applied physics and develops problem-solving skills through an understanding of optical phenomena and modern applications (such as optical fibers). It enhances analytical thinking skills.

Laser Physics complements the program's applied objectives by introducing the uses of lasers in medicine and industry. It enhances understanding of contemporary physics and links it to modern technologies.

Quantum Mechanics achieves the goal of promoting abstract and analytical thinking and represents a cornerstone for any research or graduate study. It enables students to understand the precise nature of matter and energy.

Physics of Materials links atomic structure with physical properties, supporting applied and technical aspects and providing an important foundation for modern industries (Goals Three and Five).

Numerical Analysis serves the goal of developing computer and programming skills and supports the ability to build numerical models to solve real-world problems.

Nuclear Physics addresses advanced concepts important to scientific research and highlights the responsibility of the peaceful use of energy (linked to the objectives of professional ethics, scientific research, and modern applications).

Solid State Physics deepens understanding of electronic and magnetic properties and supports the program's focus on nanotechnology and modern electronics. Plasma Physics offers advanced technologies related to energy and astrophysics, stimulating research thinking in emerging fields such as nuclear fusion.

The Graduation Project translates all objectives into practical practice, requiring students to apply knowledge, research skills, and scientific ethics to achieve objectives 1 to 6 combined.

Conclusion:

The content and outcomes of the courses in the third and fourth years reflect the program's vision in an integrated manner, through a diversity of theoretical and applied subjects, an emphasis on research and modern technologies, and the development of personal and professional skills. This diversity enhances students' readiness for the job market and graduate studies, keeping pace with contemporary scientific challenges.