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

University of Anbar
Collage for Pure Sciences
Physics Department

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 Anbar

Faculty/Institute: College of Education for Pure Science

Scientific Department: Physics

Academic or Professional Program Name: Education Physics Science

Final Certificate Name: Bachelor of Education for Physics Sciences

Academic System: Courses

Description Preparation Date: 20/3/2024

File Completion Date: 25/3/2024

Signature:

Head of Department Name:

Dr. Mahir Noori Thameel

Date: 1/3/2024

Signature:

Scientific Associate Name:

Assist. Prof. D. Harith Kamel Buniya

Date: 1.3.2024

The file is checked by: Assist. Prof. Dr. Feras Shaker Mahmood

Department of Quality Assurance and University Performance

Director of the Quality Assurance and University Performance Department:

Date: 1/3/2024

Signature:

جامعة الانبار
UNIVERSITY OF ANBAR
كلية التربية للعلوم الصرفة
قسم الفيزياء

Approval of the Dean

Prof. Dr. Abdul Rahman Salman Juma

1/3/2024

1. Program Vision

The Department of Physics at the College of Education for Pure Sciences seeks to develop the field of scientific research in this scientific department in order to reach advanced scientific development in the world, as well as to develop academic programs and curricula and contribute to solving all the problems faced by the local, regional and international community through innovative and applied scientific research in various fields, including industrial and environmental, and the vision of the department is the absolute fulfillment of the department's responsibility towards society in all fields.

2. Program Mission

Preparing and graduating trained and qualified manpower in the field of physics sciences in order to meet the needs of local, regional and international markets, as well as carrying out applied scientific research and paying attention to it, in order to develop, develop and upgrade the local community in physics sciences and its applications.The knowledge and skills necessary to support the community with specialized competencies in physics and advanced scientific research, as well as developing their scientific and practical capabilities and using them in aspects of life and finding appropriate scientific and practical solutions to them.

3. Program Objectives

1. Achieving the specified standards for the quality of material, human and technical resources.
2. Providing an academic cadre that knows its tasks and life in accordance with the work structures and regulations in which the requirements of the job description are met.
3. Providing a specialized teaching staff fluent in the use of modern technologies and methods in education with good job satisfaction.

4. Preparing academic programs according to international standards to obtain international accreditation.

5. Preparing students with scientific, practical, and educational knowledge that meets the needs of the labor market.

6. Paying attention to scientific research in terms of laboratories, research and researcher in order to achieve a distinguished research reputation locally and globally.

7. Research and professional openness to community institutions to meet their needs and aspirations.

8. Evaluating all individuals and educational processes to ensure the quality of performance and continuous improvement.

4. Program Accreditation

Procedures have been initiated to obtain accreditation according to the national standards for accrediting the programs of the educational group colleges in 2024.

5. Other external influences

The start of the school year for first-year students was delayed

6. Program Structure

Program Structure	Number of Courses	Credit hours	Percentage	Reviews*
Institution Requirements	9	18	12%	
College Requirements	11	24	15%	
Department Requirements	39	112	73%	
Summer Training				
Other				

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

11. Programmer Structure				
Level/ Year	Course or Module Code	Course or Module Title	Weekly hours	
			Lec.	Lab.
First	PHE121	Electricity	2	3
	PHE122	Magnetism	2	-
	PHE123	Mechanic	3	3
	PHE124	Properties of Matter	3	3
	PHE125	Optical engineering	3	3
	PHE126	Heat	2	-
	PHE127	Mathematics 1	2	-
	PHE128	Liner algebra	2	-
	EPS101	Educational Psychology	2	-
	EPS102	Fundamentals of Education	2	-
	UOA135	Democracy and Human rights	2	-
	UOA137	Computer science	2	-
	UOA104	English language	2	-
Second	PHE221	Optical physics	3	3
	PHE222	Advance Electric	3	3
	PHE223	Advance magnetic	3	3
	PHE224	Sound and wave motion	2	-
	PHE225	Advance calculus	3	-
	PHE226	Deferential equation	3	-
	EPS202	Growth psychology	2	-
	EPS201	Educational administration	2	-
	EPS211	Methods of Scientific Research	2	-
	PHE227	Healthy physics	2	-
	PHE228	Astronomy physics	2	-
	PHE229	Space physics	2	-
	UOA214	Programming	2	-
	UOA240	English language 2	2	-
	UOA105	Crimes of the defunct Baath Party	2	-

Third	PHE321	Atomic physics	3	3
	PHE322	Molecular physics	3	3
	PHE323	Electronics	3	3
	PHE324	Electronic circuit	3	3
	PHE325	Quantum mechanics 1	2	-
	PHE326	Analytical mechanics	2	-
	PHE327	Complex function	2	-
	PHE328	Statistical mechanic	3	-
	PHE329	New and renew energy	2	-
	PHE330	Crystals	2	-
	PHE331	Sets theory	2	-
	EPS 311	Curricula and Methodology	2	
	EPS 312	Educational Counselling and Psychological Health	2	
	UOA340	English language 3	2	
Fourth	PHE421	Solid state physics 1	3	-
	PHE422	Solid state physics 2	3	-
	PHE423	Quantum mechanics 2	2	-
	PHE424	Nuclear physics	3	3
	PHE425	Radiation physics	3	3
	PHE426	Electromagnetic	3	3
	PHE427	Electrodynamics	3	3
	PHE428	Laser physics	2	-
	PHE429	Classroom Observation	-	2
	PHE430	Nanotechnology	2	-
	EPS411	Measurement and Evaluation	2	-
	EPS412	Teaching Practicum	2	-
	EPS413	Classroom Observation	-	4
	EPS414	Graduation Research Project	2	-
	UOA440	English language 4	2	-

7. Expected learning outcomes of the program	
Knowledge	
1- Knowledge of physical phenomena and their laws 2- Knowledge of scientific research methods 3- Knowledge of physical theories and methods of proving them 4- The ability to remember the scientific foundations of physical phenomena.	Learning Outcomes Statement 1
Skills	
1 - The student should be able to work on qualifying himself to become a successful educational and scientific leader 2 - To teach the student the correct foundations in order to become a successful teacher of physics 3 - The student should learn the correct scientific method in scientific research. 4 - Enable students to acquire the skills of using virtual classrooms	
Ethics	
1.Monthly theoretical and practical tests in the curriculum taught. 2.Duties. 3.Classroom participation.	Learning Outcomes Statement 4

8. Teaching and Learning Strategies

1. Field visits in laboratories
2. Scientific application in laboratories.
3. Benefit from graduation research.
4. Presentation and presentation of educational content in virtual classrooms using multimedia (video, recorded lecture).

9. Evaluation methods

1. Articles and periodical research
2. Interviews
3. Final Exams
4. Setting assignments and assignments periodically and regularly in the virtual classroom

10. Faculty

Faculty Members

Academic Rank	Specialization		Special Requirements/Skills (if applicable)		Number of the teaching staff	
	General	Special			Staff	Lecturer
Professor doctor	Physics	Theoretical physics			١	
Professor doctor	Physics	Physics of Materials			١	
Professor doctor	Physics	Solid state			١	
Professor doctor	Physics	Nuclear Physics			١	
Assistant Professor Doctor	Physics	Nuclear Physics			١	
Assistant Professor Doctor	Physics	Nanotechnology			١	
Assistant Professor Doctor	Physics	laser			١	
Assistant Professor Doctor	Physics	pollution			١	
Lecturer Doctor	Physics	Nanomaterials			١	
Lecturer Doctor	Physics	Electro-optics			١	
Lecturer Doctor	Physics	Physics of Materials			١	
Lecturer Doctor	Physics	Nanotechnology			٢	
Lecturer Doctor	Physics	Applied Physics			١	
Lecturer Doctor	Physics	Electronics			١	
Lecturer Doctor	Physics	laser			١	
Assistant Lecturer	Physics				٨	
Research Assistant	Physics				٢	

Professional Development

Mentoring new faculty members

1- Work to raise the level of professional performance in the interest of the student and the college and compliance with university regulations and laws.

2- Working to enhance the student's self-confidence by focusing on positive behaviors and effective contributions to building a personality aware of its role in the development of society capable of carrying scientific and moral honesty in their professional lives.

3- Ensuring the exchange of experiences and visits by the teaching staff to universities and colleges outside Iraq as an auxiliary role to reformulate curricula to serve the development of the educational process.

Professional development of faculty members

1- The use of modern scientific sources.

2- Using fast communication networks to transfer information such as the Internet

3. Visits and practical practices in service laboratories.

4- Acquiring scientific and modern experiences and skills in the field of marginal technical communication

11. Acceptance Criterion

1- Admission according to the general and central average system.

2- Admission to the departments according to the student's desire and modified.

3- The requirement for the graduate of the preparatory school and the scientific branch exclusively.

4- 4. To need a personal interview with the department.

5- High school average.

6- The absorptive capacity of the college.

12.	**The most important sources of information about the program**
1-	Methodological books approved by the sectoral committee of the faculties of education for pure sciences.
2-	Auxiliary books.
3-	Books and enrichment sources / sources in English
4-	Additional sources of the Internet.
5-	Training courses held by the university on e-learning platforms.

13.	Program Development Plan
1-	Ensure keeping pace with the corresponding programs in the countries of the world in order to obtain accreditation.
2-	Developing curricula to suit the achievement of the first point
3-	Raising the level of teaching staff to suit the achievement of the goals of the college and the university to obtain accreditation.

Curriculum Skills Map

Year / Level	Course Code	CourseTitle	Core (C) or Option (O)	Programmer Learning Outcomes															
				Knowledge and understanding				Subject-specific skills				Thinking Skills				General and Transferable Skills (or) Other skills relevant to employability and personal development			
				A1	**A2**	**A3**	**A4**	**B1**	**B2**	**B3**	**B4**	**C1**	**C2**	**C3**	**C4**	**D1**	**D2**	**D3**	**D4**
First	PHE121	Electricity	Core	√	√		√		√			√					√		
	PHE122	Magnetism	Core	√	√		√		√			√					√		
	PHE123	Mechanic	Core	√	√		√		√			√					√		
	PHE124	Material prperties	Core	√	√		√		√			√					√		
	PHE125	Giometrical Optical	Core	√	√		√		√			√					√		
	PHE126	Heat and Properties of Matter	Core	√	√		√		√			√					√		
	PHE127	Mathematics 1	Core	√	√		√		√			√					√		
	PHE128	Liner algebra	Core	√	√		√		√			√					√		
	EPS101	Educational Psychology	Core			√		√					√	√		√		√	
	EPS102	Fundamentals of Education	Core			√		√					√	√		√		√	
	UOA135	Democracy and Human rights	Core			√		√		√		√	√	√		√		√	
	UOA137	Computer science	Core		√		√	√										√	
	UOA141	Computer science	Core				√	√		√	√				√				√
	UOA140	English language	Core				√	√		√					√				√

Curriculum Skills Map

Year / Level	Course Code	CourseTitle	Core (C) or Option (O)	Programme Learning Outcomes															
				Knowledge and understanding				Subject-specific skills				Thinking Skills				General and Transferable Skills (or) Other skills relevant to employability and personal development			
				A1	**A2**	**A3**	**A4**	**B1**	**B2**	**B3**	**B4**	**C1**	**C2**	**C3**	**C4**	**D1**	**D2**	**D3**	**D4**
Second	PHE221	Optical physics	Core	√	√				√			√					√	√	
	PHE222	Advance Electric	Core	√	√				√			√					√	√	
	PHE223	Advance magnetic	Core	√	√				√			√					√	√	
	PHE224	Sound and wave motion	Core	√	√				√			√					√	√	
	PHE225	Advance calculus	Core	√	√				√			√					√	√	
	PHE226	Deferential equation	Core	√	√				√			√					√	√	
	EPS202	Growth psychology	Core			√		√	√			√				√			
	EPS201	Educational administration	Core			√		√	√			√			√	√			
	EPS211	Methods of Scientific Research	Core				√	√	√	√							√		
	PHE227	Healthy physics	Option	√	√				√			√					√		
	PHE228	Astronomy physics	Option	√	√				√			√					√		
	PHE229	Space physics	Option	√	√				√			√					√		
	UOA214	Programming	Core				√	√		√	√				√				√
	UOA240	English language 2	Core				√								√				√
	UOA105	Crimes of Baath	Core			√		√		√		√	√	√		√		√	

Curriculum Skills Map																			
				Programmer Learning Outcomes															
Year / Level	Course Code	CourseTitle	Core (C) or Option (O)	Knowledge and understanding				Subject-specific skills				Thinking Skills				General and Transferable Skills (or) Other skills relevant to employability and personal development			
				A1	**A2**	**A3**	**A4**	**B1**	**B2**	**B3**	**B4**	**C1**	**C2**	**C3**	**C4**	**D1**	**D2**	**D3**	**D4**
Third	PHE321	Atomic physics	Core	√	√				√			√					√		
	PHE322	Molecular physics	Core	√	√				√			√					√		
	PHE323	Electronics	Core	√	√				√			√					√		
	PHE324	Electronic circuit	Core	√	√				√			√					√		
	PHE325	Quantum mechanics 1	Core	√	√				√			√					√		
	PHE326	Analytical mechanics	Core	√	√				√			√					√		
	PHE327	Complex function	Core	√	√				√			√					√		
	PHE328	Statistical mechanic	Core	√	√				√			√					√		
	PHE329	New and renew energy	Option	√	√				√			√					√		
	PHE330	Crystals	Option	√	√				√			√					√		
	PHE331	Sets theory	Option	√	√				√			√					√		
	EPS 311	Curricula and Methodology	Core		√	√		√	√			√	√		√	√	√	√	
	EPS 312	Educational Counselling and Psychological Health	Core			√		√	√			√	√		√	√	√		
	UOA340	English language 3	Core				√	√											√

Curriculum Skills Map																		
Programmer Learning Outcomes																		
Year / Level	Course Code	CourseTitle	Core (C) or Option (O)	Knowledge and understanding				Subject-specific skills				Thinking Skills				General and Transferable Skills (or) Other skills relevant to employability and personal development			
				A1	**A2**	**A3**	**A4**	**B1**	**B2**	**B3**	**B4**	**C1**	**C2**	**C3**	**C4**	**D1**	**D2**	**D3**	**D4**
Fourth	PHE421	Solid state physics 1	Core	√	√				√			√					√		
	PHE422	Solid state physics 2	Core	√	√				√			√					√		
	PHE423	Quantum mechanics 2	Core	√	√				√			√					√		
	PHE424	Nuclear physics	Core	√	√				√			√					√		
	PHE425	Radiation physics	Core	√	√				√			√					√		
	PHE426	Electromagnetic	Core	√	√				√			√					√		
	PHE427	Electrodynamics	Core	√	√				√			√					√		
	PHE428	Laser physics 1	Core	√	√				√			√					√		
	PHE429	Classroom Observation	Core	√	√				√		√	√					√		
	PHE430	Nanotechnology	Option	√	√				√			√			√		√		
	EPS411	Measurement and Evaluation	Core		√	√	√		√			√				√	√	√	√
	EPS412	Teaching Practicum	Core		√	√	√	√	√			√	√		√	√	√	√	√
	EPS413	Classroom Observation	Core		√	√	√	√	√			√	√		√	√	√	√	√
	EPS414	Graduation Research Project	Core	√			√	√	√	√			√		√				√
	UOA440	English language 4	Core	√			√	√	√										√

Course Description Form

1. Course Name: **Electrodynamic**

2. Course Code:

PHE427

3. Semester / Year: **Second Semester / 2023-2024**

4. Description Preparation Date: **2/3/2024**

5. Available Attendance Forms: **Presence**

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

3 hours theoretical / week * 15 weeks = ٤٥ hours / semester

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

Name: **Dr. Jamal fahdil Mohammad**
Email: esp.jamalf.mohamad@uoanbar.edu.iq

8. Course Objectives

Course Objectives	• The student knows the rules basic in Electrodynamic. • The student gets to know the scientific basis in the Maxwell's equations • The student gets to know the wave equation in free space, solved examples, problem. • The student gets to know electromagnetic energy.

9. Teaching and Learning Strategies

Strategy	Lecture, discussion, short reports, problem solving

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
١	3	knowledge and understanding	Maxwell's equations their empirical basis	Lecture desiccation	Short questions with homework solving
٢	3	knowledge and understanding	Maxwell's equations integral form	Lecture desiccation	Short questions with homework solving
٣	3	knowledge and understanding	The generalization (Ampere's law)	Lecture desiccation	Short questions with homework solving
٤	3	knowledge and understanding	The wave equation vector potential	Lecture desiccation	Short questions with homework solving
٥	3	knowledge and understanding	The wave equation electric scalar potential	Lecture desiccation	Short questions with homework solving
٦	3	knowledge and understanding	Electromagnetic Energy, The wave equation	Lecture desiccation	Short questions in addition assignment
٧			Semester Exam		Short questions
٨	3	knowledge and understanding	The relation between field and circuit theory: Maxwell's equations	Lecture desiccation	Attendance (various questions)
٩	3	knowledge and understanding	Plane waves in dielectric g media	Lecture desiccation	Short Questions Assignments
١٠	3	knowledge and understanding	Plane waves in conducting media	Lecture desiccation	Short questions
١١	3	knowledge and understanding	Impedance of dielectric media	Lecture desiccation	Short questions
١٢	3	knowledge and understanding	Depth of penetration (skin effect)	Lecture desiccation	Short questions
١٣	3	knowledge and understanding	Energy relation in a traveling wave	Lecture desiccation	Short questions
١٤	3	knowledge and understanding	Antenna Radiation poynting vector elliptically or circularly polarized wave	Lecture desiccation	Attendance (various questions)
١٥			The relation between field and circuit theory: Maxwell's equations		Drawing an illustration of material studied during class

11. Course Evaluation

Monthly exam = 30 marks
Daily exams = 10 marks
Final exam = 60 marks

12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	**1. Introduction to Electrodynamics by David Griffth**
Main references (sources)	**Electromagnetism book - written by B.B. Laud Wiley**
Recommended books and references (scientific journals, reports…)	Any book on Electrodynamic
Electronic References, Websites https://www.google.com/search?q=Electrodynamics+books+pdf&oq=Electrodynamics+books+pdf&aqs=chrome..69i57.9709j0j7&sourceid=chrome&ie=UTF-8	

Course Description Form

13. Course Name: **Electromagnetic**	
14. Course Code:	
PHE426	
15. Semester / Year: **First Semester / 2023-2024**	
16. Description Preparation Date: **2/10/2023**	
17.Available Attendance Forms: **Presence**	
18.Number of Credit Hours (Total) / Number of Units (Total)	
3 hours theoretical / week * 15 weeks = ٤٥ hours / semester	
19. Course administrator's name (mention all, if more than one name)	
Name: **Dr. Jamal fahdil Mohammad** Email: **esp.jamalf.mohamad@uoanbar.edu.iq**	
20. Course Objectives	
Course Objectives	• The student knows the rules basic in electromagnetic. • The student gets to know the scientific basis in the Electrostatic and Application of Gauss 's law. • The student gets to know the tangential component of E, Piosson 's and Laplace 's equations, application of Piosson 's and Laplace 's equations, solved examples, problem.
21. Teaching and Learning Strategies	
Strategy	Lecture, discussion, short reports, problem solving

22. Course Structure					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
١	3	knowledge and understanding	Chapter 1 / 1- vector analysis Examples of solved	Lecture desiccation	Short questions with homework solving
٢	3	knowledge and understanding	Chapter II/ Coordinate systems	Lecture desiccation	Short questions with homework solving
٣	3	knowledge and understanding	Electrostatic -Solving exercises of the second semester	Lecture desiccation	Short questions with homework solving
٤	3	knowledge and understanding	Ch. III/ Electric field and Gauss's law	Lecture desiccation	Short questions with homework solving
٥	3	knowledge and understanding	Solution of Electrosta Problem	Lecture desiccation	Short questions with homework solving
٦	3	knowledge and understanding	The Electrostatic Field in Dielectric Media Solving Chapter Three Problems	Lecture desiccation	Short questions in addition assignment
٧			Semester Exam		Short questions
٨	3	knowledge and understanding	Chapter IV / Electric Susceptibility and dielectric constant	Lecture desiccation	Attendance (various questions)
٩	3	knowledge and understanding	boundary conditions of the field vectors	Lecture desiccation	Short Questions Assignments
١٠	3	knowledge and understanding	Electrostatic Energy Solving Chapter IV problems	Lecture desiccation	Short questions
١١	3	knowledge and understanding	Chapter V The Magnetism, The Magnetization Equations of Field،	Lecture desiccation	Short questions
١٢	3	knowledge and understanding	Magnetic properties matters, Magnetic Flux Solved examples	Lecture desiccation	Short questions
١٣	3	knowledge and understanding	Magnetic Susceptibility and magnetic Permeability Solving Fifth Chapter Exercises	Lecture desiccation	Short questions

١٤	3	knowledge and understanding	Semester Exam	Lecture desiccation	Attendance (various questions)
١٥			Review		Drawing an illustration of material studied during class

23. Course Evaluation

Monthly exam = 30 marks
Daily exams = 10 marks
Final exam = 60 marks

24. Learning and Teaching Resources

Required textbooks (curricular books, if any)	**Electromagnetic theory**
Main references (sources)	**Foundation Of Electromagnetic Theory By: John R. Reitz, Frederick J. Milford & Robert W. Christy**
Recommended books and references (scientific journals, reports…)	Any book on electromagnetism

Electronic References, Websites

https://www.google.com/search?q=electromagnetic+theory

Course Description Form

25. Course Name:
Molecular Physics
26. Course Code:
PHE322
27. Semester / Year:
Second semester 2023-2024
28. Description Preparation Date:
6-4-2024
29. Available Attendance Forms:
Attendance
30. Number of Credit Hours (Total) / Number of Units (Total)
3 hours per week
31. Course administrator's name (mention all, if more than one name)
Name: Waleed Subhi Hwash Email: waleed973@ahoo.com
32. Course Objectives

Course Objectives	• **The student knows the molecular structure** • **• The student knows what molecular bonds are and how obtain them** • **• The student will learn about calculating the energy molecular spectra**

33. Teaching and Learning Strategies	
Strategy	

34. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Introducing the student to introduction to molec physics	Introduction to molec physics	Atheoretical explanation the board with examples	Daily ex discussion, assignments, monthly exams
2	3	Explanation of chem bonds	Chemical bonds	Atheoretical explanation the board with examples	Daily ex discussion,

					assignments, monthly exams
3	3	Introducing the student to rotation of molecules	Rotation of molecules	Atheoretical explanation the board with examples	Daily ex discussion, assignments, monthly exams
4	3	Introducing the student molecular spectra	Molecular spectra	A theoretical explana on the board with exam	Daily ex discussion, assignments, monthly exams
5	3	Clarifying and explaining rotational energy of a li particle (rigid rotor)	Rotational energy o linear particle (r rotor)	A theoretical explana on the board with exam	Daily ex discussion, assignments, monthly exams
6	3	Introducing the student to number of particles rotational energy levels	Number of particles rotational energy leve	A theoretical explana on the board with exam	Daily ex discussion, assignments, monthly exams
7	3	Explanation of non-rigid r	Non-rigid rotor	A theoretical explana on the board with exam	Daily ex discussion, assignments, monthly exams
8	3	Addressing the spectrum polyatomic molecules	Spectrum of polyato molecules	A theoretical explana on the board with exam	Daily ex discussion, assignments, monthly exams
9	3	Introducing the student to spectrum of linear molecul	Spectrum of li molecules	A theoretical explana on the board with exam	Daily ex discussion, assignments, monthly exams
10	3	First month exam	Third month exam	A theoretical explana on the board with exam	Daily ex discussion, assignments, monthly exams
11	3	Introducing the student vibrational energy	Vibrational energy	A theoretical explana on the board with exam	Daily ex discussion, assignments, monthly exams
12	3	Introducing the student to harmonic vibration diatomic molecules	Introduction to molec physics	A theoretical explana on the board with exam	Daily ex discussion, assignments, monthly exams
13	3	Explaining non-harm vibration	Chemical bonds	A theoretical explana on the board with exam	Daily ex discussion, assignments, monthly exams
14	3	review	Rotation of molecules	A theoretical explana on the board with exam	Daily ex discussion, assignments, monthly exams
15	3	Second exam	Second exam	A theoretical explana on the board with exam	Daily ex discussion, assignments, monthly exams

35. 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

36. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Modern Physics, A. Serway, J. Moses and A. Mo 3rd ed. 2005.
Main references (sources)	Modern Physics, Paul A. Tipler and Ralph Llewellyn, 5th ed. 2008.
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

Course Description Form

1. Course Name:
English
2. Course Code:
UOA440
3. Semester / Year:
First Semester / 2023-2024
4. Description Preparation Date:
7/4/2024
5. Available Attendance Forms:
Presence
6. Number of Credit Hours (Total) / Number of Units (Total)
2 hours per week * 15 weeks = 30 hours / semester
7. Course administrator's name (mention all, if more than one name)
Name: Adil S. Matuk Email: adeal.matuk@uoanbar.edu.iq
8. Course Objectives

Course Objectives	Improvement the level of students in the English langu and training them to practice in their academic and l the basic rules of this international language and using all fields. Learn how to select (simplified) reading material suit for their level and read on their own. Understand and use tenses like the simple present, present progressive, the simple past, and the progressive.

9. Teaching and Learning Strategies	
Strategy	Lecture, discussion, short reports, problem solving

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	knowledge and understanding	Introduction, Present, past, future tenses - Examples of solved	Lecture + desiccation	Short questions with homework solving
2	2	knowledge and understanding	Passive and active, vocabulary	Lecture + desiccation	Short questions with homework solving
3	2	knowledge and understanding	Academic writing , Reading, vocabulary	Lecture + desiccation	Short questions with homework solving
4	2	knowledge and understanding	Grammar	Lecture + desiccation	Short questions with homework

					solving
5	2	knowledge and understanding	Reading Comprehension	Lecture + desiccation	Short questions with homework solving
6	2	knowledge and understanding	Academic Reading , vocabulary,	Lecture + desiccation	Short questions
7			Semester Exam		Attendance test (various questions)
8	2	knowledge and understanding	Reading Comprehension	Lecture + desiccation	Short questions
9	2	knowledge and understanding	Grammar	Lecture + desiccation	Short Questions + Assignments
10	2	knowledge and understanding	Academic Reading , vocabulary,	Lecture + desiccation	Short questions
11	2	knowledge and understanding	Reading Comprehension	Lecture + desiccation	Short questions
12	2	knowledge and understanding	Academic Reading , vocabulary,	Lecture + desiccation	Short questions
13	2	knowledge and understanding	Academic Reading , vocabulary,	Lecture + desiccation	Short questions
14			Semester Exam		Attendance test (various questions)
15		Thestudent's understanding of the material tucked during the semester * The student's knowledge to link all of the above	Review		Drawing an illustration of the material studied during the class

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. New Headway English Course – Workbook upp intermediate (by: Liz & John Soars) 2. New Headway English Course – Student Book upper intermediate (by: Liz & John Soars)
Main references (sources)	
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

Course Description Form

37.	Course Name: Geometrical Optics
38.	Course Code:
PHE125	
39.	Semester / Year: second/1st class
40.	Description Preparation Date:8/4/2024
41.	Available Attendance Forms: presence
42.	Number of Credit Hours (Total) / Number of Units (Total) 5 hours (3 theoritical,2 practical)
43.	Course administrator's name (mention all, if more than one name)
Name: Assistant Prof. Salam Khalaf Mousa Email: salam.khalaf@uoanbar.edu.iq	
44.	Course Objectives

Course Objectives	(a) **The student should know how light propagates, reflec and refract** (b) (c) **The student should know how images are formed lenses and mirrors** (c) (d) **The student knows the types of optical devices a how they work**

45.	Teaching and Learning Strategies

Strategy	**A. Knowledge and understanding** 1-The student understands how light is transmitted, reflected, and refracted 2-The student will know how images are formed in lenses and mirrors

46. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3theoritical 2 practical		**Propagation of light**	lectures	Short questions with homew solving
2	3theoritical 2 practical		**Spherical surfaces**		
3			**Gaussian formula**		
4	3theoritical 2 practical		**Thin lenses**		
5			**Lens makers formula**		
6	3theoritical 2 practical		**Image formation using thin lenses**		
7			**Exam**		
8	3theoritical 2 practical		**Combination of lenses** **Thick lenses**		
9			**Spherical mirrors** **Mirror formula**		
10	3theoritical 2 practical		**IMAGE FORMATION IN SPHER**		
11	3theoritical 2 practical		**Mirror problems**		
12			aberrations		
13	3theoritical 2 practical		Optical instruments **Exam**		
14	3theoritical 2 practical				
15					

47. 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 -Activity
-Short questions
-Reports
-Duties
-Final Exam

48. Learning and Teaching Resources	
Required textbooks (curricular books any)	
Main references (sources)	**1 - Fundamentals of optics** **Edited by(Francis A. Jenkins &** **Harvey E. White)**
Recommended books and references (scientific journals, reports…)	**2-Principles of optics ,by MAX BORN Cambridge Univers Press,April2013**
Electronic References, Websites	

Course Description Form

49. Course Name: Laser physics	
50. Course Code:	
PHE428	
51. Semester / Year: second/fourth class	
52. Description Preparation Date:8/4/2024	
53.Available Attendance Forms: presence	
54.Number of Credit Hours (Total) / Number of Units (Total) 2 hours	
55. Course administrator's name (mention all, if more than one name)	
Name: Assistant Prof. Salam Khalaf Mousa Email: salam.khalaf@uoanbar.edu.iq	
56. Course Objectives	
Course Objectives	**1- To make the student understand the idea of lasers 2- Introduce the student to the foundations of laser generation. 3- Introduce the studen the optical resonator, its purpose and types. 4- Introduce the student to the pump methods and pumping plans used in laser devices. 5- Introduce the student to the type lasers and power plans. 6- Introducing the student to laser output and the techniques u in it. 7- Introducing the student to the properties of lasers. 8- Introducing the student to applications of laser rays in various fields.**
57. Teaching and Learning Strategies	
Strategy	**B. Knowledge and understanding** Introducing the student to the idea of lasers. 2- Introducing the student to the foundation laser generation. 3- Introducing the student to the optical resonator, its purpose and types Introducing the student to the pumping methods and pumping plans used in laser devices
58. Course Structure	

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2 theoretical		**Laser and maser idea Laser and maser**	lectures	Short questions with homew solving
2	2 theoretical		**Principles of l production**		
3	2 theoretical		**Plans and methods pumping**		
4	2 theoretical				
5			**Resonator definition operation**		
6	2 theoretical		**Resonator design**		
7	2 theoretical		**Resonator stability Exam**		
8	2 theoretical				
9			**Vibration modes**		
10	2 theoretical		**Laser modulation**		
11	2 theoretical				
12	2 theoretical		**Laser modes**		
13					
14	2 theoretical		**Laser types**		
15	2 theoretical		**Lasers applications**		

59. 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 -Activity
-Short questions
-Reports
-Duties
-Final Exam

60. Learning and Teaching Resources

Required textbooks (curricular books any)	
Main references (sources)	1-"فيزياء الليزر وبعض التطبيقات العملية"، سهام عفيف قندلا. دار الشؤون الثقافية العامة دار النشر سنة النشر 1992 2-الليزر و تطبيقاته المؤلف فاروق بن عبد الله الوطبان الناشر دار المريخ للنشر، ١٩٨٧
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

Course Description Form

61. Course Name: Physical Optics	
62. Course Code:	
PHE221	
63. Semester / Year: second/1st / second class	
64. Description Preparation Date:8/4/2024	
65.Available Attendance Forms: presence	
66.Number of Credit Hours (Total) / Number of Units (Total) 5 hours(3 theoritical,2 practical)	
67. Course administrator's name (mention all, if more than one name)	
Name: Assistant Prof. Salam Khalaf Mousa Email: salam.khalaf@uoanbar.edu.iq	
68. Course Objectives	
Course Objectives	**1- The student will understand the basics of physical optics. 2- Introd the student to the phenomenon of light interference, how it occurs and applications. 3- Introduce the student to the phenomenon of l diffraction, how it occurs and its applications. 4- Introduce the studen the phenomenon of polarization of light, how it occurs and applications.**
69. Teaching and Learning Strategies	
Strategy	**C. Knowledge and understanding** The student's understanding of the basics of physical optics. 2- Introducing the stud to the phenomenon of light interference, how it occurs and its applications. Introducing the student to the phenomenon of light diffraction, how it occurs and applications. 4- Introducing the student to the phenomenon of polarization of li how it occurs and its applications.

70. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3theoritical 2 practical		Huygen's principle, Young's experi interference fringes from a d source	lectures	Short questions with homew solving
2	3theoritical 2 practical		intensity distribution in the fringe system, Fresnel's Biprism, other apparatus depending on division of the wave front, coherent sources, division of amplitude ,Michelson interferometer, circular fringes, visibility of fringes		
3	2 3theoritical 2 practical				
4	3theoritical 2 practical		interferometer measurements of length,Twyman and Green interferometer ,index of refraction by interference methods, reflection from a plane-parallel film, fringes of equal inclination, Newton's rings, problems.		
5	3theoritical 2 practical				
6					
7					
8	3theorical 2 practical		Fresnel and fraunhofer diffraction, diffraction by a single slit, further investigations of single-slit pattern,		
9					
10	3theoritical 2 practical				
11			rectangular aperture, resolving power with a rectangular aperture, chromatic resolving power of a prism, circular aperture, resolving power of a telescope, resolving power of a microscope, the double slit, qualitative aspects of the pattern		
12					
13	3theoritical 2 practical 3theorical 2 practical		derivation of the equation for the intensity, comparison of the single-slit and double –slit patterns, distinction between interference and diffraction, problems		
14	3theortiical 2 practical 3theortiical 2 practical		POLARIZATION Polarization by reflection, representation of the vibrations in light, polarization angle and		

15	3theoritical 2 practical		Brewster's law polarization by apile of plates, law of Malus, polarization by dichoric crystals, polarization by double refraction, Nickolprism parallel and crossed Nickols, polarization by scattering, problems.		

71. 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 -Activity
-Short questions
-Reports
-Duties
-Final Exam

72. Learning and Teaching Resources

Required textbooks (curricular books any)	
Main references (sources)	1 - Fundamentals of optics Edited by(Francis A. Jenkins & Harvey E. White)
Recommended books and references (scientific journals, reports…)	2-Principles of optics ,by MAX BORN Cambridge Univers Press,April2013
Electronic References, Websites	

Course Description Form

73. Course Name:	
Solid State Physics 1	
74. Course Code:	
PHE421	
75. Semester / Year:	
1/2023-2024	
76. Description Preparation Date:	
7/4/2024	
77. Available Attendance Forms:	
50 Students	
78. Number of Credit Hours (Total) / Number of Units (Total)	
30 Theoretical Units	
79. Course administrator's name (mention all, if more than one name)	
Name: Prof. Dr. Bilal K. Al-Rawi Email: sc.bilal_alrawi@uoanbar.edu.iq	
80. Course Objectives	
Course Objectives	• **Providing the student with knowledge of the types of states of matter.** • **Providing the student with knowledge of the crystalline structure of solid materials.** • **Providing the student with knowledge of the debye model of specific heat.** • **Providing the student with knowledge of incompatible crystal reactions.** • **Providing the student with knowledge in the field of hall.**
81. Teaching and Learning Strategies	
Strategy	1. **Giving lectures and solving mathematical problems on the blackboard.** 2. **Using modern technologies and electronic presentation tools (Data Show) to illustrate shapes, drawings, and diagrams.** 3. **Divide students into small groups for laboratory work.** 4. **Use the role-exchange method in the practical laboratory.** 5. **Focus on students' participation in the lecture by asking questions and devising new ideas.** 6. **Assigning the student to prepare scientific reports on laboratory experiments.** 7. **Adopting the homework method for students to solve exercises while**

	evaluating their solutions in the classroom

82. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2		Introduction	Lecture	Oral exam with written test exams
2	2		Phonos and lattice	Lecture	
3	2		Inelastic scattering of phonon	Lecture	
4	2		Group velocity	Lecture	
5	2		The structure properties	Lecture	
6	2		Optical properties in infrared	Lecture	
7	2		Thermal properties (heat capacity)	Lecture	
8	2		Thermal conductivity	Lecture	
9	2		Thermal resistivity	Lecture	
10	2		Free electron model-lorentz model	Lecture	
11	2		Hall effect	Lecture	
12	2		Quantum of free electron model	Lecture	
13	2		Fermi-Dirc statisties	Lecture	
14	2		Plasmon	Lecture	
15	2		Electrical conductivity	Lecture	

83. 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

84. Learning and Teaching Resources

Required textbooks (curricular books, if any)	
Main references (sources)	**1- Solid State Physics / Dr. Moaeed Gabriel.** **2- Electrical and magnetic properties / Dr. Wakaa Al-Jubouri and Dr. Fahd Ghalib.** **3. Solid state physics / Dr. Yahya Nouri Al-Jamal/University of Mosul**
Recommended books and references (scientific journals, reports…)	**Introduction to Solid State Physics : Charles Kittel-8th**
Electronic References, Websites	

Course Description Form

85. Course Name:
Solid State Physics 2
86. Course Code:
PHE422
87. Semester / Year:
1/2023-2024
88. Description Preparation Date:
7/4/2024
89. Available Attendance Forms:
50 Students
90. Number of Credit Hours (Total) / Number of Units (Total)
30 Theoretical Units
91. Course administrator's name (mention all, if more than one name)
Name: Prof. Dr. Bilal K. Al-Rawi Email: sc.bilal_alrawi@uoanbar.edu.iq
92. Course Objectives

Course Objectives	• **Providing The Student With Practical Experience In Identifying The X−Ray Device And How To Use It.** • **Providing The Student With Scientific Experience In Identifying The UV Visible Device And How To Use It.** • **Providing The Student With Knowledge Of The Theory Of Beams In Solid Materials.** • **Providing The Student With Knowledge Of Semiconductors.** • **Providing The Student With Knowledge Of Crystal Defects**
93. Teaching and Learning Strategies	
Strategy	**8. Giving lectures and solving mathematical problems on the blackboard.** **9. Using modern technologies and electronic presentation tools (Data Show) to illustrate shapes, drawings, and diagrams.** **10. Divide students into small groups for laboratory work.** **11. Use the role-exchange method in the practical laboratory.** **12. Focus on students' participation in the lecture by asking questions and devising new ideas.** **13. Assigning the student to prepare scientific reports on laboratory experiments.** **14. Adopting the homework method for students to solve exercises while**

	evaluating their solutions in the classroom

94. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2		Effctive mass-fermi surface constriction Semiconductors (intrinsic and entrinsic Mobility and electrical conductivity Photo conductivity Crystal defects and dislocation Point, lines defects. surface, Volume defects Superconductors Uses of superconductors Magnetic properties Dia-magnetic materials Para-magnetic materials Experimental diffraction methods Ferromagnetic materials Semiconductors	Lecture Lecture Lecture Lecture Lecture Lecture Lecture Lecture Lecture Lecture Lecture Lecture Lecture Lecture Lecture	Oral exam with written test exams

95. 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

96. Learning and Teaching Resources

Required textbooks (curricular books, if any)	
Main references (sources)	**1- Solid State Physics / Dr. Moaeed Gabriel.** **2- Electrical and magnetic properties / Dr. Wakaa Al-Jubouri and Dr. Fahd Ghalib.** **3. Solid state physics / Dr. Yahya Nouri Al-Jamal/University of Mosul**
Recommended books and references (scientific journals, reports…)	**Introduction to Solid State Physics : Charles Kittel-8th**
Electronic References, Websites	

Course Description Form

1. Course Name:
Quantum mechanics – part one
2. Course Code:
PHE325
3. Semester / Year:
2nd course , 2024
4. Description Preparation Date:
1-2-2024
5. Available Attendance Forms:
Attendance
6. Number of Credit Hours (Total) / Number of Units (Total)
2 hours / 2 units
7. Course administrator's name (mention all, if more than one name)
Name: Prof.Dr. Saeed Naif Turki Email: esp.saeedn.turkisntr2006@uoanbar.edu.iq
8. Course Objectives

Course Objectives	***Learn student about paradoxes between classical and experimental physics** ***Explain all paradoxes in right way in quantum mechanics** ***Learn students about Schrodinger equation ans its applicatio**
9. Teaching and Learning Strategies	
Strategy	Learn and Motives students of 3rd stage in physics department abo using the principle of quantum mechanics to describe all microphys system in right way that applicable with experimental physics

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
١	2		The paradox betwe classical physics a experimental physics	Lecture	Short questions

٢	2		The Physical Foundations of Quantum mechanics What is the quantum mechanics Why quantum mechanics is importa	Lecture	Short questions
٣	2		Wave–particle duality Heisenberg uncertainty principle Correspondence Principle	Lecture	Short questions
٤	2		Elementary Propertie of Quantum Mechanic	Lecture	Short questions
٥	2		Introduction, Wave function in quantum mechanics Normalization condition , Orthogonality conditi and orthonormal condition of wave functions.	Lecture	Short questions
٦	2		Test 1		
٧	2		Normalized functions Eigenvalues Eigenfunctions Expected Value	Lecture	Short questions
٨	2		Eigenfucntions and constants of motion Solution of dependent Schrodinger equation	Lecture	Short questions
٩	2		Characteristics of energy levels and wave function	Lecture	Short questions

١٠	2		Schrodinger equation Types of Schrodinger equations How one get of any ty of Schrodinger equati	Lecture	Short questions
١١	2		One-dimensional solution of Schrodinge equation to free parti	Lecture	Short questions
١٢	2		One-dimensional solution of Schrodinge equation to Infinite square well	Lecture	Short questions
13	2		One-dimensional solution of Schrodinge equation to finite square well	Lecture	Short questions
14	2		Examples	Lecture	Short questions
15	2		Test 2		

11. Course Evaluation

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

40 degree quiz and month exams , 60 degree final exam

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	***Principles of Quantum Mechanics , by Salim AlSHamaya , University of Mosul , 1988.** ***Quantum Mechanics by S. Alhusayani , Iraq.**
Main references (sources)	**Quantum Mechanics by L. I. Schiff**
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

Course Description Form

1. Course Name:

Quantum mechanics – part two

2. Course Code:

PHE423

3. Semester / Year:

First course , 2023

4. Description Preparation Date:

1-10-2023

5. Available Attendance Forms:

Attendance

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

2 hours / 2 units

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

Name: Prof.Dr. Saeed Naif Turki
Email: esp.saeedn.turkisntr2006@uoanbar.edu.iq

8. Course Objectives

Course Objectives	***Learn students about Operators.** ***Learn students about Solving Schrodinger equation in 3-D.** ***Learn students about using approximation methods in quant mechanics.**

9. Teaching and Learning Strategies

Strategy	Learn and Motives students of fourth stage in physics department abo using the operators and their types and their physical meaning. Application Schrodinger equation in single atom of electron. Knowing the method of approximations in quantum mechanics

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
١	2		Operators , Eigenval equation a commutator	Lecture	Short questions

			operators		
٢	2		Hermitian operator : Define , conditions an examples	Lecture	Short questions
٣	2		Orthonormality condition of wave functions, Super position principle in quantum mechanics and expectation value	Lecture	Short questions
٤	2		Angular momentum operators , commutators of Angular momentum operators and Examples	Lecture	Short questions
٥	2		Test 1		Short questions
٦	2		Spherically Symmetrical Systems : Central Force and Hydrogen atom.	Lecture	
٧	2		Probability Density of single electron atom and Selection rules of Hydrogen atom with Examples	Lecture	Short questions
٨	2		Approximations methods in quantum mechanics: Perturbation method First Approximation (Solution of perturbed Schrodinger equation - First order	Lecture	Short questions
٩	2		Solution of second	Lecture	Short questions

			order of perturbed Schrodinger equation		
١٠	2		Solution of second order of perturbed Schrodinger equation	Lecture	Short questions
١١	2		Examples	Lecture	Short questions
١٢	2		Test 2		Short questions
13	2		Virial Method	Lecture	Short questions
14	2		WKB Method	Lecture	Short questions
15	2		Examples	Lecture	

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

40 degree quiz and month exams , 60 degree final exam

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	***Principles of Quantum Mechanics , by Salim AlSHamaya , University of Mosul , 1988.** ***Quantum Mechanics by S. Alhusayani , Iraq.**
Main references (sources)	**Quantum Mechanics by L. I. Schiff**
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

Course Description

1. Course Name:
Electronics
2. Course Code:
PHE323
3. Semester/Year:
First Semester / 2024
4. Date of Description Preparation:
4/4/2024
5. Available Attendance Formats:
In-person
6. Total Study Hours/Units:
3 theoretical hours + 2 practical hours / week * 15 weeks = 75 hours / semester / 4 units
7. Course Coordinator(s):
Name: Dr. Omar Mahdi Dawood Email: esp.omarm.dawood@uoanbar.edu.iq
8. Course Objectives:
• To acquaint students with the classification of materials based on their electrical properties: conductors, insulators, and semiconductors. • To introduce students to the scientific basis of the work and manufacturing of semiconductor materials. • To familiarize students with the factors influencing the determination of the basic properties of semiconductor materials. • To introduce students to the factors influencing the selection of practical applications based on semiconductor materials.
9. Teaching and Learning Strategies:
Lecture, discussion, short reports, problem-solving.
10. Course Structure:

Week	Hours	Learning Outcomes	Unit/Topic Name	Learning Method	Assessment Method

1	3 Theoretical 2 Practical	*Understanding basic concepts in electricity and electronics	First Chapter: • Electric Circuit • Electric Voltage • Electric Current • Resistors • Reading Electrical Resistors • Kirchhoff's Voltage and Current Law • Solved Examples	Lecture + Lab	Short Questions with Solutions + Assignments
2	3 Theoretical 2 Practical	*Understanding basics of semiconductor physics	Second Chapter: • Introduction • Energy Bands in Crystals • Conducting, Insulating, and Semiconductor Materials • Pure Semiconductors • Doped Semiconductors	Lecture + Lab	Short Questions with Solutions + Assignments
3	3 Theoretical 2 Practical	*Understanding basics of semiconductor physics	• N-type Semiconductors • P-type Semiconductors • Charge Density in Doped Semiconductors • Current Flow in Doped Semiconductors • Exercises Solutions for Chapter Two	Lecture + Lab	Short Questions
4	3 Theoretical 2 Practical	*Understanding basics of semiconductor diode operation	Chapter Three: • Introduction to Diode • PN Junction Diode • Depletion Region	Lecture + Lab	Short Questions
5	3 Theoretical 2 Practical	*Understanding basics of semiconductor diode operation	• Barrier Voltage • PN Junction in Forward Bias • Energy Band Diagram of PN Junction • Barrier Voltage Calculation • PN Junction under External Bias • Forward Bias of PN Junction • Reverse Bias of PN Junction	Lecture + Lab	Short Questions + Assignments

6	3 Theoretical 2 Practical	*Understanding basics of semiconductor diode operation	• Analysis of Diode Circuit • Zener Diode • Tunnel Diode • Problem Solving for Chapter Three	Lecture + Lab	Short Questions
7	-	-	Midterm Exam	-	
8	3 Theoretical 2 Practical	*Understanding applications of semiconductor diode operation	<u>Chapter Four: Uses of Diode</u> • Introduction • Rectification • Half-Wave Rectifier Circuit	Lecture + Lab	Short Questions
9	3 Theoretical 2 Practical	*Understanding applications of semiconductor diode operation	• Full-Wave Rectifier Circuit • Bridge Rectifier • Ripple Factor • Filtering Circuits • Clipping Circuits	Lecture + Lab	Short Questions + Assignments
10	3 Theoretical 2 Practical	*Understanding applications of semiconductor diode operation	• Voltage Multiplier Circuit • Clipping Circuits • Voltage Regulation • Problem Solving for Chapter Four	Lecture + Lab	Short Questions
11	3 Theoretical 2 Practical	*Understanding basics of transistor operation	<u>Chapter Five / Transistor:</u> • Introduction • Basic Characteristics of Transistor	Lecture + Lab	Short Questions
12	3 Theoretical 2 Practical	*Understanding transistor operation regions	• Transistor Operation Principle • Transistor Connection Methods • Common Base Connection • Common Emitter Connection • Common Collector Connection • Solved Examples	Lecture + Lab	Short Questions
13	3 Theoretical 2 Practical	*Understanding transistor operation regions	• Transistor Operating Regions • Active Region • Cutoff Region • Saturation Region	Lecture + Lab	Short Questions

			• Problem Solving for Chapter Five		
14	-	-	Midterm Exam	-	
15	-	*Student's understanding of the material covered during the semester *Student's ability to link all previously mentioned	Review	-	Drawing Diagrams of the Material Covered During the Semester

11. Course Assessment:	
The grade distribution out of 100 is based on tasks assigned to the students such as daily preparation, daily exams, oral exams, monthly exams, written exams, reports, etc.	
12. Learning and Teaching Resources:	
Required Textbooks (Curriculum):	"Physics of Electronics" by Dr. Sobhi Saeed Al-Rawi
Main References (Sources):	"Basic Electronics" by Rakesh Kumar Garg "Electronic Devices: Electron Flow Version" by Thomas L. Floyd
Recommended Supplementary Books and References (Journals, Reports, etc.):	Electronicsforu website: https://www.electronicsforu.com/category/technology-trends/learn-electronics
Electronic References, Websites:	All About Circuits: https://www.allaboutcircuits.com/textbook/

Course Description

13. Course Name:
Electronic Circuits
14. Course Code:
PHE324
15. Semester/Year:
Second Semester / 2024
16. Date of Description Preparation:
4/4/2024
17. Available Attendance Formats:
In-person
18. Total Study Hours/Units:
3 theoretical hours + 2 practical hours / week * 15 weeks = 75 hours / semester / 4 units
19. Course Coordinator(s):
Name: Dr. Omar Mahdi Dawood Email: esp.omarm.dawood@uoanbar.edu.iq
20. Course Objectives:
• To understand the operation of semiconductor devices. • To comprehend the analysis of direct current and alternating current models for semiconductor devices. • To apply the concepts of regulator design and audio amplifiers. • To verify theoretical concepts through laboratory experiments and simulation. • To execute small projects based on the concepts of electronic circuits.
21. Teaching and Learning Strategies:
Lecture, discussion, short reports, problem-solving.
22. Course Structure:

Week	Hours	Learning Outcomes	Unit/Topic Name	Learning Method	Assessment Method
1	3 Theoretical 2 Practical	Understanding the basic concepts of	Chapter One: • Transistor	Lecture + Lab	Short Questions

		transistor circuit analysis.	• Transistor Operation Principle • Relationship Between Load Current and Control Current • Relationship Between Input and Output Voltages • Verification of Transistor State Mathematically • Power Dissipation in Transistors • Solved Examples		with Solutions + Assignments
2	3 Theoretical 2 Practical	Understanding the fundamentals of transistor biasing circuits.	Chapter Two: • Introduction to Transistor Biasing Circuits • Q-Point (Operating Point) in Continuous Operation • Selection of Q-Point • Solved Examples	Lecture + Lab	Short Questions with Solutions + Assignments
3	3 Theoretical 2 Practical	Understanding the basics of factors affecting the stability of transistor biasing circuits.	• Stability of Q-Point • Stability Factor of Q-Point	Lecture + Lab	Short Questions
4	3 Theoretical 2 Practical	Understanding the basics of stability techniques for transistor biasing circuits.	• Biasing Techniques for Transistors • Suitable Biasing Method • Fixed Biasing • Solved Examples	Lecture + Lab	Short Questions
5	3 Theoretical 2 Practical	Understanding the basics of stability techniques for transistor biasing circuits.	• Emitter Resistance Biasing • Solved Examples	Lecture + Lab	Short Questions + Assignments
6	3 Theoretical 2 Practical	Understanding the basics of stability techniques for transistor biasing circuits.	• Voltage Divider Biasing • Solved Examples • Suitable Compensation Method	Lecture + Lab	Short Questions
7	-		Midterm Exam	-	
8	3 Theoretical 2 Practical	Exploring the applications of transistors in amplification circuits.	• Chapter Three: • Introduction to Amplifier Circuits	Lecture + Lab	Short Questions

			• Elements of AC and DC Circuits • Methods of Representing AC Waves •		
9	3 Theoretical 2 Practical	Exploring the applications of transistors in amplification circuits.	• Magnitude of Gain in AC Voltage and Current • Common Emitter Amplifier Circuit. Solved Examples	Lecture + Lab	Short Questions + Assignments
10	3 Theoretical 2 Practical	Understanding the basics and applications of logic circuits.	<u>Chapter Four:</u> • Introduction to Logic Circuits • Binary Numbers • Conversion from Decimal to Binary System • Conversion from Binary to Decimal System	Lecture + Lab	Short Questions
11	3 Theoretical 2 Practical	Understanding the fundamentals of binary calculation for logic circuits.	• Binary Calculation • Binary Addition Operation • Binary Subtraction Operation • Binary Division Operation	Lecture + Lab	Short Questions
12	3 Theoretical 2 Practical	Understanding the basics of logical gates using transistors.	• Binary Logic Gates • AND Logic Gate • OR Logic Gate • NOT Logic Gate • NAND Logic Gate • NOR Logic Gate	Lecture + Lab	Short Questions
13	3 Theoretical 2 Practical	Understanding the basics of Boolean algebra for logic circuits.	• Boolean Algebra • Solved Examples	Lecture + Lab	Short Questions
14	-	-	Midterm Exam	-	
15	-	Demonstrating the ability to link all previously mentioned concepts.	Review	-	Drawing Diagrams of the Material Covered During the Semester
23. Course Assessment:					
The grade distribution out of 100 is based on tasks assigned to the students such as daily preparation, daily exams, oral exams, monthly exams, written exams, reports, etc.					

24. Learning and Teaching Resources:	
Required Textbooks (Curriculum):	"Physics of Electronics" by Dr. Sobhi Saeed Al-Rawi
Main References (Sources):	"Basic Electronics" by Rakesh Kumar Garg "Electronic Devices: Electron Flow Version" by Thomas L. Floyd
Recommended Supplementary Books and References (Journals, Reports, etc.):	Electronicsforu website: https://www.electronicsforu.com/category/technology-trends/learn-electronics
Electronic References, Websites:	All About Circuits: https://www.allaboutcircuits.com/textbook/

Course Description Form

97. Course Name:	
Mechanical Properties	
98. Course Code:	
PHE123	
99. Semester / Year:	
First course , 2023	
100. Description Preparation Date:	
1-10-2023	
101. Available Attendance Forms:	
Attendance	
102. Number of Credit Hours (Total) / Number of Units (Total)	
6 hours / 3 unit	
103. Course administrator's name (mention all, if more than one name)	
Name: Prof.Dr. Waleed Bdaiwi Email: esp.waleedb.salih@uoanbar.edu.iq	
104. Course Objectives	
Course Objectives	* A. The student knows about the science of mechanics... B. The student knows the properties of mechanics C. The student recognizes the important laws and theories in r D. The student learns about practical application and the conn .
105. Teaching and Learning Strategies	
Strategy	1. A- Knowledge and understanding: The student understands what mechanics is 2. The student will be able to understand and solve the problems related to each chapter 3. The student learns how to apply what he learned in the theoretical lecture and how it can be applied in the laboratory 4. B- Subject-specific skills: Learn the mathematics skill well, how to understand mechanical problems, and how to solve them at the end of each chapter 5. The student learns to understand mechanics and important theories

106. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
١	3 Theor etical 3 practi	Short questions with homewor solutions	Units of measurement measurement systems - thi that can be measured movement - rate of speed	*Knowing basic concepts Defining understanding u of measuremen measurement systems - thi that can measured movement - rate speed	Short questions
٢	3 Theor etical 3 practi	Short questions with homewor solutions	– Linear velocity – Fall of free bodies – Vector quantities – Non-vector quantities – Numerical multiplication	Defining understanding linear velocity falling free bod vector quantitie non-vector quantities numerical multiplication	Short questions
٣	3 Theor etical 3 practi	Short questions	Cross multiplication - triangular numerical multiplication, cross multiplication, movement i plane	Cross multiplication triangular numerical multiplication, cross multiplication, movement in plane	Short questions
٤	3 Theor etical 3 practi	Short questions	Mass - weight - measuring devices Friction – uniform circular motion	Mass - weight - measuring devices Friction – unifor circular motion	Short questions
٥	3 Theor etical 3 practi	Short questions addition assignme	Projectiles - Newton's seco and third laws	* Knowing basics Projectile Newton's sec and third laws	Short questions
٦	3 Theor etical 3 practi	Short questions	Solve end-of-chapt problems		
٧	3	Electroni test (vari	Semester test		Short questions

	Theor etical 3 practi	questions			
٨	3 Theor etical 3 practi	Short questions	Mass - weight - measuring devices Friction	* Knowing the basics Mass - weight - measuring devices	Short questions
٩	3 Theor etical 3 practi	Short questions assignme	uniform circular motion	* Knowing uniform circular motion	Short questions
١٠	3 Theor etical 3 practi	Short questions	Centripetal force is the rotation of a body on a vertical circle Universal law of gravitatio	* Knowing Centripetal force is the rotation of a body on a vertical circle Universal law gravitation	Short questions
١١	3 Theor etical 3 practi	Short questions	Work and energy The theory of work and energy Conservative and n conservative forces	* Know the asics Work and energy The theory of work and energy Conservative and non-conservative forces	Short questions
١٢	3 Theor etical 3 practi	Short questions	Potential energy, potential energy and its relationship to conservative force Total mechanical energy o moons and planets	* Know the bas Potential energy,potential energy and relationship conservative fo Total mechani energy of oons a planets	Short questions
13	3 Theor etical 3 practi	Short questions	Solve end-of-chapter problems		Short questions
14	3 Theor etical 3 practi	Electroni test (vari questions	Semester test		Short questions

15	3 Theor etical 3 practi	Draw illustrativ diagram the mate studied during semester	review	*The student's understanding of the material studied during the semester *The studer knowledge of connection between all of above	

107. 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

30 degree quiz and month exams and 10 practical , 60 degree final exam

108. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Muhammad Qaisroun's methodological books, Mechanics an Properties of Matter, University of Bahrain, Department Libr
Main references (sources)	Muhammad Kadhim: Heat and Properties of Matter, Univer of Baghdad, Central Library
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

Course Description Form

109. Course Name:
Thermodynimcs
110. Course Code:
111. Semester / Year:
Second semester 2023−2024
112. Description Preparation Date:
6−4−2024
113. Available Attendance Forms:
Attendance
114. Number of Credit Hours (Total) / Number of Units (Total)
3 hours per week
115. Course administrator's name (mention all, if more than one name)
Name: Sundus Abdulrazzaq Taresh Email: sundisa.tarish@uoanbar.edu.iq
116. Course Objectives

Course Objectives	• **The student knows the basic thermodynmics** • **• To improve the efficiency of a process for the information between energy and work** • **• To studyt energy conversion in different forms.**

117. Teaching and Learning Strategies

Strategy	

118. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Introducing the student to introduction thermodynamics	Basic in concepts thermodynamics	Atheoretical explanation the board with examples	Daily ex discussion, assignments, monthly exams
2	3	Explanation of temperature and its measurement	Temperature and measurement	Atheoretical explanation the board with examples	Daily ex discussion, assignments, monthly exams
3	3	Introducing the student top	Behavior of purematte	Atheoretical explanation the board with examples	Daily ex discussion,

		Pure matter			assignments, monthly exams
4	3	Introducing the student to Theories in thermodynami	Useful theories thermodynamics	A theoretical explana on the board with exam	Daily ex discussion, assignments, monthly exams
5	3	Clarifying and explaining Equation state	Equation state	A theoretical explana on the board with exam	Daily ex discussion, assignments, monthly exams
6	3	Introducing the student to the first law thermodynamics	The first law thermodynamics	A theoretical explana on the board with exam	Daily ex discussion, assignments, monthly exams
7	3	Explanation the second lav thermodynamics	Explanation the sec law of thermodynamic	A theoretical explana on the board with exam	Daily ex discussion, assignments, monthly exams
8	3	Explanation the applicatio And problems of the sec law of thermodynamics	the applications And problems of second law thermodynamics	A theoretical explana on the board with exam	Daily ex discussion, assignments, monthly exams
9	3	review	review	A theoretical explana on the board with exam	Daily ex discussion, assignments, monthly exams
10	3	First month exam	First month exam		
11	3	Explaining the entropy	Entropy	A theoretical explana on the board with exam	Daily ex discussion, assignments, monthly exams
12	3	Introducing the student to harmonic vibration diatomic molecules	Introduction to molec physics	A theoretical explana on the board with exam	Daily ex discussion, assignments, monthly exams
13	3	Explaining the calculate The change in entropy	calculate The change in entropy	A theoretical explana on the board with exam	Daily ex discussion, assignments, monthly exams
14	3	review	review	A theoretical explana on the board with exam	Daily ex discussion, assignments, monthly exams
15	3	Second exam	Second exam		

119. 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

120. Learning and Teaching Resources

Required textbooks (curricular books, if any)	A Textbook of chemical engineering thermodynamic K.V. Narayanan 2011
Main references (sources)	Thermodynamics, A. Amjad, S. Madlom and Motalib, 2000.
Recommended books and references (scientific journals, reports…)	

Electronic References, Websites	