

**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 PHYSICS DEPARTMENT

2025–2024

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: Mustansiriyah University

Faculty/Institute: College of Education

Scientific Department: Department of Physics

Academic or Professional Program Name: Bachelors in Physics

Final Certificate Name: Bachelors in Physics

Academic System: Annual

Description Preparation Date: 2/5/2024

File Completion Date: 4/6/2024



الاستاذ الدكتور
اسماعيل عبد الله خلاطي
رئيس قسم الفيزياء

Signature:

Head of Department Name:

Prof. Dr. Ismaeel Abdullah Akhlati

Date: 14-10-2024

Signature:

Scientific Associate Name:

Asst. Prof. Dr. Ala'a Hussien Shenashil

Date: 14-10-2024

The file is checked by:

Department of Quality Assurance and University Performance

Date: 14-10-2024

Signature:

14/10/2024

Director of the Quality Assurance and University Performance Department:



14/10/2024

1. Program Vision

The College of Education seeks to prepare graduates in the field of physics to work in government departments and benefit from the specialization in the field practical and applied and teaching in schools.

2. Program Mission

Work to prepare and graduate pioneering scientific and leadership competencies in the sciences of physics and in developing the knowledge balance in the field of scientific research in the field of physics to serve the community as well as training and refining the minds of students scientifically and cognitively, emphasizing social and cultural values and responding to the requirements of the local market.

3. Program Objectives

The academic educational program aims to develop faculty members and improve their performance and make graduates qualified and able to obtain a job opportunity whether in education or in various sectors of society.

4. Program Accreditation

None

5. Other external influences

None

6. Program Structure

Program Structure	Number of Courses	Credit hours	Percentage	Reviews*
Institution Requirements	7	14	19%	Basic course
College Requirements	8	16	22%	
Department Requirements	22	59	59%	
Summer Training	None			
Other				

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

7.	8. Program Description				
Year/Level	Course Code	Course Name	Credit Hours		
			Theoretical	practical	UNITS
1	509080101	Mechanics	3	2	8
2	509080102	Heat and Properties of Matter	2		4
3	509080103	Electricity and Magnetism	3	2	8
4	509080104	Mathematics	3		6
5	509080105	English Language	1		2
6	509080106	Educational Psychology	2		4
7	509080107	FUNDAMENTAL EDUCATION	2		4

8	509080108	Arabic Language	2		4
9	509080109	Human Rights and Democracy	1		2
10	509080110	COMPUTER	1	1	2
Year/Level	Course Code	Course Name	Credit Hours	Year/Level	UNITS
1	509080201	Optics	3	2	8
2	509080202	Advanced Electricity and Magnetism	2	2	6
3	509080203	Astrophysics	2		4
4	509080204	Mathematics / 2	2		4
5	509080205	Sound and Wave Motion	2		4
6	509080206	Computers / 2	1	1	4
7	509080207	Scientific Research Methodology	1		2
8	509080208	Developmental Psychology	2		4
9	509080209	Secondary Education and Educational Administration	2		4
10	509080210	English Language	1		2
Year/Level	Course Code	Course Name	Credit Hours	Year/Level	UNITS
1	509080301	Atomic and Molecular Physics	3	2	8
2	509080302	Thermodynamics	3		6
3	509080303	Electronics	3	2	8
4	509080304	Analytical Mechanics	3		6
5	509080305	Complex Functions	2		4

6	509080306	Plasma Physics	2		4
7	509080307	Counseling and Mental Health	2		4
8	509080308	Teaching Methods and Curricula	2		4
9	509080309	English Language	1		2
Year/Level	Course Code	Course Name	Credit Hours	Year/Level	UNITS
1	509080401	Nuclear Physics	3	2	8
2	509080402	Solid State Physics	2		4
3	509080403	Quantum Mechanics	3		6
4	509080404	Electromagnetism	3		6
5	509080405	Laser	2		4
6	509080406	Measurement and Evaluation	2	2	6
7	509080407	Educational Laboratory	-	3	6
8	509080408	English Language	2		4
9	509080409	Research Project	1	2	4
10	509080410	Viewing and application	1		2

9. Expected learning outcomes of the program

Knowledge

The student should know what physics is.

The student should know the fields of applied physics.

The student should know the basic concepts in physics.

The student should know the physics teaching methods at all stages.

Skills	
The student should know how to use and work some devices such as speed filter, mass spectrometer and hole system.	Solving exercises from the scheduled book and from the auxiliary sources
The student should know how to connect and use some laboratory devices such as kelaanometer and alasloscope	The student should know how the RL, RC, RLC alternating current circuits work.
Ethics	
The student wishes to practice scientific, inductive, inferred and logical thinking	Tends to participate in teamwork as a unified team to succeed in his career, proper ethical behavior and effective communication among them.
He is interested in the importance of lifelong learning through professional development and practical training.	Uses the correct educational and psychological methods within educational and educational institutions.

10. Teaching and Learning Strategies

1. Throwing the syringe
2. Discussion
3. E-learning through electronic programs in applications
4. Brainstorming

11. Evaluation methods

1– Daily, oral and editorial examinations (with board and paper).

2–Solve the issues of each chapter on the blackboard.

3– Preparing reports on some chapters of the topic.

4–Regular monthly exams.

5–Adoption of classroom discussions.

6– Providing duties (homework) and scientific research.

12. Faculty

Faculty Members

Academic Rank	Specialization		Number of the teaching staff	
	General	Special	Staff	Lecturer
Prof. Dr. Hassan Nouri Abd Al-Wahab	Physics	Electro-optics	PHD	Prof
Prof. Dr. Ahmed Farhan Atwan	Physics	Polymer materials	PHD	Prof
Prof. Dr. Zainab Abd Al-Salam Jabr	Physics	Image processing	PhD	Prof
Prof. Dr. Ziyad Muhammad Abboud	Physics	Laser physics	PhD	Prof
Prof. Dr. Abd Al-Karim Hussein Dagher	Physics	Thin Films/Na	PhD	Prof

		nosensors			
Prof. Dr. Ghada Sabah Karam Shaaban	Physics	Astronomical Spectrum Measurements	PhD	Prof	
Prof. Dr. Ali Ahmed Youssef	Physics	theoretical atomic physicsThin membranes	PhD	Prof	
Prof. Dr. Ismail Abdullah Akhlati	Physics	Electro-optics and renewable energy	PhD	Prof	
Prof. Dr. Adnan Yousef Hussein	Physics	Thin Film Nanosensors	PhD	Asst. Prof.	
Prof. Khadir Abbas Mushjel	Physics	optics	Master	Prof	
Prof. Dr. Mohammed Jawad Yassin	Physics	Plasma Physics	PhD	Prof	
Prof. Dr. Hassan Hadi Darwish	Physics	Electronic optics		Prof	
Prof. Dr. Faten Shukor Zain Al-Abidin	Physics	optics	PhD	Prof	
Prof. Dr. Aintisar Hato Hashem	Physics	Plasma Physics	PhD	Prof	

Asst. Prof. Dr. Saadi Raheem Abbas	Physics	Electro-optics	PhD	Asst Prof	
Asst. Prof. Dr. Tariq Hashem Aboud	Physics	Electronic optics	PhD	Asst. Prof.	
Asst. Prof. Dr. Saba Jameel Hassan	Physics	Thin membranes	PhD	Prof	
Prof. Dr. Hassan Abd Al-Sahib Hadi	Physics	Thin films/nanosensors	PhD	Prof	
Prof. Dr. Raghad Ismail Ibrahim	Physics	Laser and Electro-Optics	PhD	Prof	
Prof. Dr. Huda Karim Hussein	Educational and psychological sciences	General curricula and teaching methods	PhD	Prof	
Asst. Prof. Zeina Abdul Ali Dawood	English Language	Methods Of teaching English	Master	Asst Prof	
Asst. Prof. Dr. Faez Mohamed Hassan	Physics	Image processing	PhD	Asst Prof	

Lect. Dr. Raheem Lafta Ali	Physics	Plasma Physics	PhD	Lect.	
Asst. Prof. Dr. Heba Saad Rashid	Physics	Thin films/sensors	PhD	Asst Prof	
Lect. Dr. Hiyam Jaseb Majid.	Physics	Plasma Physics	PhD	Lect	
Lect. Dr. Wasmaa Abdul Sattar Jabbar	Physics	Atomic physics	PhD	Lect	
Asst. Lect. Khaled Ghaleb Mohammed	Physics	Electro-optics	Master	Lect	
Lect. Hana Khazim Issa	Physics	Materials /Polymers	Master	Asst Lect	
Lect. Dr. Ali Jasib Hussein	Physics	Theoretical physics	PhD	Lect	
Lect. Dr. Sabah Hassan Juma	Physics	nano thin films	PhD	Lect	
Asst. Lect. Nadia Mohammed Jassim	Physics	Molecular	Master	Asst Lect	
Asst. Lect. Rabab Mohammed Habib	Physics	Image processing	Master	Asst Lect	
Asst. Lect. Mushtaq Talib Hamza	Physics	Image processing	Master	Asst Lect	
Asst. Lect. Abdul Latif Abdul Jabbar Jassim	Physics	Image processing	Master	Asst Lect	

Asst. Lect.Ahmed Mohamed Hassan	Physics	Physics teaching methods	Master	Asst Lect	
Asst. Lect.Marwa Mohamed Ali Karim	Physics	Materials	Master	Asst Lect	
Asst. Lect.Mariam Osama Abdel Karim	Physics	Materials	Master	Asst Lect	
Asst. Lect.Safa Kamal Mustafa	Physics	(Laser and Electro-Optics)	Master	Asst Lect	
Asst. Lect.Namaa Rahim Salem	Physics	Laser and Electro-Optics	Master	Asst Lect	
Asst. Lect. Mohammed Mohsen Ne'meh	Physics	Nuclear	Master	Asst Lect	
Asst. Lect. Fikrt Hikmat Jassim	Physics	Solid	Master	Asst Lect	

Professional Development

Mentoring new faculty members

1– Preparing a course program for each subject by the teacher .

2 – Follow the program accurately.

3– Issues of questions, summer discussions and student evaluations.

Admission criterion (regulations on college or institute admissions):

13. Acceptance Criterion

The student should get a rate of at least 70% in preparatory study / scientific branch.

14. The most important sources of information about the program

- 1– Relying on sources from the best international universities.
- 2 – Central Library of the University
- 3 – College Library
- 4 – Department Library
- 5 – Articles
- 6 – Internet.

15. Program Development Plan

1– Preparing a course program for each subject by the teacher .

2 – Follow the program accurately.

3– Issues of questions, summer discussions and student evaluations.

Admission criterion (regulations on college or institute admissions):

Curriculum Skills Chart																			
Please place a signal in the boxes corresponding to individual learning outputs from the evaluated program																			
Learning outputs required from the program																			
General skills and rehabilitation transferred (other skills related to employability and personal development)				Emotional and Value Goals				Skills Objectives of the Program				Knowledge Objectives				Baisic or Optional	Topic Name	Topic Symbol	Year / Level
D4	D3	D2	D1	C4	C3	C2	C1	B4	B3	B2	B1	A4	A3	A2	A1				
√	√	√	√			√	√		√	√	√	√	√	√	√	Basic	Mechanics	509080101	First Stage 2023-2034
√	√	√	√		√	√	√		√	√	√	√	√	√	√	Basic	Heat and Properties of a Substance	509080102	
√	√	√	√		√	√	√		√	√	√	√	√	√	√	Basic	Electrical and Magnetic	509080103	

	√	√	√	√	√	√	√		√	√	√	√	√	√	√	√	Basic	Mathematics / 1	509080104	
√	√	√	√	√	√	√	√		√	√	√	√	√	√	√	√	Basic	Computer Science /1	509080105	
																				Second Stage 2023-2034
√	√	√	√		√	√	√		√	√	√	√	√	√	√	√	Basic	Optics	509080201	
	√	√	√	√	√	√	√		√	√	√	√	√	√	√	√	Basic	Advanced Electrical and Magnetic	509080202	
√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	Basic	Astronomy Physics	509080203	
	√	√	√	√	√	√	√		√	√	√	√	√	√	√	√	Basic	Mathematics //2	509080204	
√	√	√	√	√	√	√	√		√	√	√	√	√	√	√	√	Basic	Sound and Wave Movement	509080205	
	√	√	√			√	√			√	√			√	√		Basic	Computer Science /2	509080206	
		√	√				√			√	√	√	√	√	√	√	Basic	Scientific Research Curriculum	509080207	
																				Thied Stage 2023-2034
√	√	√	√				√		√	√	√	√	√	√	√	√	Basic	Atomic and Molecular Physics	509080301	
√	√	√	√		√	√	√		√	√	√	√	√	√	√	√	Basic	Thermodainmck	509080302	
√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	Basic	Electronics	509080303	
√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	Basic	Analytical Mechanics	509080304	
√	√	√	√		√	√	√		√	√	√	√	√	√	√	√	Basic	Complex functions	509080305	

√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	Optional	Optional (Plasma physics)	509080306	Fourth Stage 2018-2021
√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	Basic	Nuclear Physics	509080401	
√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	Basic	Solid State Physics	509080402	
		√	√	√	√	√	√	√	√	√	√	√	√	√	√	Basic	Quantum Mechanics	509080403	
		√	√		√		√		√	√	√	√	√	√	√	Basic	Electromagnetic	509080404	
√	√	√	√	√	√	√	√		√	√	√			√	√	Basic	Laser	509080405	

Mechanics – First Level (Morning and Evening)

1. Course Name:
Mechanics
2. Course Code:
509080101
3. Semester / Year:
Annual/2025
4. Description Preparation Date:
12/12/2025
5. Available Attendance Forms:
Bachelor
6. Number of Credit Hours (Total) / Number of Units (Total)
3 hours
7. Course administrator's name (mention all, if more than one name)
1 – Prof. Dr. Hassan Nouri Abd Al-Wahab 2– Prof. Dr. Adnan Yousif 3– Prof. Mustafa Shaker Hashem
8. Course Objectives
Classical mechanics is one of main field's for studying mechanic which concerned with description of big bodies' movement that near the human, such as projectile, planets, spacecraft, stars and microscopic bodies, beside that, mechanic predicts by many physical properties when it deals with gases, liquids and solids. Classical mechanic is divided to: static, which describe static bodies and its equilibrium conditions, dynamic, which dealing with bodies' movements and forces produced it.

9. Teaching and Learning Strategies					
Strategy					
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Bachelor	Systems of units. Systems of coordinates. Scalar and Vector Quantities. Components of a vector and a unit vector.	attendance	
2	3	Bachelor	Adding and Subtracting Vectors. Multiplications of Vectors Problems.	attendance	
3	3	Bachelor	Displacement and Distance, Velocity and Speed, One Acceleration, dimensional. Motion with Constant Acceleration	attendance	
4	3	Bachelor	Free Falling Objects	attendance	
5	3	Bachelor	The Displacement, Velocity and Acceleration Vectors.	attendance	
6	3	Bachelor	Two-Dimensional Motion With Constant Acceleration, Projectile Motion Problems.	attendance	
7	3	Bachelor	Uniform Circular Motion, Non-Uniform Circular Motion Problems.	attendance	

8	3	Bachelor	The Concept of Force, Newton's Laws (first, second, and third law)	attendance	
9	3	Bachelor	The Force of Gravity and Weight	attendance	
10	3	Bachelor	Force of Friction (static and kinetic)	attendance	
11	3	Bachelor	Centripetal Force, Problems.	attendance	
12	3	Bachelor	Work (Work Done by a Constant Force, Work Done by a Varying Force)	attendance	
13	3	Bachelor	Work Done by a Spring,	attendance	
14	3	Bachelor	Kinetic Energy and the Work–Kinetic Energy Theorem.	attendance	
15	3	Bachelor	Potential Energy (Gravitational Potential Energy and Elastic Potential Energy)	attendance	
16	3	Bachelor	Conservative and Non–conservative Forces, Relationship Between Conservative Forces and Potential Energy,	attendance	
17	3	Bachelor	Conservation of Mechanical Energy, Work Done by Non–conservative Forces.	attendance	
18	3	Bachelor	Linear Momentum and Its Conservation, Linear Impulse and Linear Momentum,	attendance	
19	3	Bachelor	Rotational Kinematics: Rotational Motion with Constant Angular Acceleration	attendance	
20	3	Bachelor	Angular and Linear Quantities, Rotational Energy	attendance	

21	3	Bachelor	Rotation of a rigid object about a fixed axis	attendance	
22	3	Bachelor	Rigid object under constant angular acceleration	attendance	
23	3	Bachelor	Angular and translational quantities	attendance	
24	3	Bachelor	Angular Momentum, Angular Impulse.	attendance	
25	3	Bachelor	Conservation of Angular Momentum,	attendance	
26	3	Bachelor	Kinetic energy of rotation	attendance	
27	3	Bachelor	Calculation of moments of inertia	attendance	
28	3	Bachelor	Torque, Work, and Energy in Rotational Motion Problems.	attendance	
29	3	Bachelor	Torque, Work, and Energy in Rotational Motion Problems.	attendance	
30	3	Bachelor	Rolling Motion of a Rigid Object (kinetic energy of a rolling object) ,Problems	attendance	

11. Course Evaluation

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12. Learning and Teaching Resources

Required textbooks	
Main references	
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	

Heat and Material Properties – First Level (Morning and Evening)

1. Course Name:
Heat and Material Properties – First Level
2. Course Code:
509080102
3. Semester / Year:
Annual/ 2025
4. Description Preparation Date:
11/ 7 /2025
5. Available Attendance Forms: Bachelor
Attendance / Weekly
6. Number of Credit Hours (Total) / Number of Units (Total)
2 hours per week / 60 hours per academic year / 120 Number of Units
7. Course administrator's name (mention all, if more than one name)
1 – Prof. khudheir Abbas Mishjil 2– Prof. Dr. Sami Salman chiad
8. Course Objectives
Course Objectives: This course is an essential part of the physics curriculum in Colleges of Education, helping prepare students as teachers in accordance with modern educational approaches. It is particularly significant for first-year students for several reasons: - As a prerequisite for advancing to higher levels of study. - Preparing students for the study of thermodynamics. - Introducing students to fundamental concepts relevant to daily life. Objectives A - Cognitive Objectives 1 - The student should be able to understand temperature, the principles of temperature measurement, and temperature scales. 2 - The student should be able to understand the concept of phase, transformations of matter, and the phase diagram. 3 - The student should be able to understand the mechanical properties of materials. 4 - The student should be able to understand the magnetic properties of materials. B - Course Skill Objectives 1 - The student should be able to distinguish between states of matter. 2 - The student should be able to measure temperature using a thermometer.

3 - The student should be able to solve mathematical examples.
C - Affective and Value-Based Objectives
1 - Pose questions on topics that are open to discussion by students in class.
2 - Pose questions for the students to solve for the class.
3 - Conduct daily quick quizzes with intellectual questions.
4 - Conduct a brief report session involving two or more students to study a topic related to the curriculum.

9. Teaching and Learning Strategies

Strategy	1. The student will be able to compare heat measurements using thermometers. 2. Distinguish between methods of thermal conductivity. 3. The student will gain an understanding of specific heat and how to measure it. 4. The student will be familiar with phase formation and its importance. 5. The student will understand the state transitions of matter. 6. The student will be able to distinguish between real and ideal gases. 7. The student will be able to explain the difference between gas laws and how to apply them. 8. The student will learn the meaning of internal energy. 9. The student will understand the difference between the specific heat of gases at constant volume and pressure. 10. Conduct an experiment to calculate specific gravity and surface tension. 11. Interpret Pascal's principle, Archimedes' principle, Bernoulli's equation, Torricelli's equation, and Wiesel's equation. 12. Compare capillary action and surface tension. 13. Identify the types of stress and strain. 14. Calculate Young's modulus and the modulus of elasticity. 15- Conduct an experiment to measure the Poisson ratio. 16- Compare diamagnetism, paramagnetism, and ferromagnetism. 17- Distinguish between insulators, semiconductors, and conductors. 18- The effect of temperature on conductivity of solids. 19- The student recognizes the fourth state of matter and can compare it with other states of matter. 20- The student understands what plasma is, how it is generated, and how it is contained.
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10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Ability to compare temperature scales using thermometers	Temperature, foundations of temperature measurement, temperature scales	Using PDF lectures, employing QR barcode technology, using artificial intelligence questions, research and	Develop a question plan, set questions, and conduct daily quizzes.

				discovery, and creative thinking. Smartboard discussion. Linking the material to reality.	
2	2	Distinguish between thermal expansion in solids, liquids, and gases	Resistance thermometer, effect of temperature change on states of matter, thermal expansion, expansion of solids, liquids, gases, heat transfer mechanisms	Using PDF lectures, employing QR barcode technology, using artificial intelligence questions, research and discovery, and creative thinking. Smartboard discussion. Linking the material to reality.	Develop a question plan, set questions, and conduct daily quizzes.
3	2	Differentiate between methods of heat conduction	Conduction, convection, radiation, low temperatures, solved examples, thermal energy sources, relationship between energy and matter, problems	Using PDF lectures, employing QR barcode technology, using artificial intelligence questions, research and discovery, and creative thinking. Smartboard discussion. Linking the material to reality.	Develop a question plan, set questions, and conduct daily quizzes.
4	2	Understand specific heat and how to measure it	Heat and phase changes, effects of heat, specific heat quantity, measurement methods, phase concept, phase transitions, phase diagram	Using PDF lectures, employing QR barcode technology, using artificial intelligence questions, research and discovery, and creative thinking. Smartboard discussion. Linking the material to reality.	Develop a question plan, set questions, and conduct daily quizzes.
5	2	Comprehend phase changes of matter	Triple point of water, phase changes, evaporation, melting, boiling, sublimation, first law of thermodynamics	Using PDF lectures, employing QR barcode technology, using artificial intelligence questions, research and discovery, and creative thinking. Smartboard	Develop a question plan, set questions, and conduct daily quizzes.

				discussion. Linking the material to reality.	
6	2	Understand the first law of thermodynamics and its applications	Applications of the first law of thermodynamics, solved examples	Using PDF lectures, employing QR barcode technology, using artificial intelligence questions, research and discovery, and creative thinking. Smartboard discussion. Linking the material to reality.	Develop a question plan, set questions, and conduct daily quizzes.
7	2		First semester exam		
8	2	Differentiate between ideal and real gases and apply gas laws	Gases, ideal vs. real gas, kinetic theory, Avogadro's number, gas laws (Boyle's, Charles')	Using PDF lectures, employing QR barcode technology, using artificial intelligence questions, research and discovery, and creative thinking. Smartboard discussion. Linking the material to reality.	Develop a question plan, set questions, and conduct daily quizzes.
9	2	Understand internal energy	Gas constant, ideal gas law, Van der Waals equation, internal energy, specific heat capacities (C_p , C_v)	Using PDF lectures, employing QR barcode technology, using artificial intelligence questions, research and discovery, and creative thinking. Smartboard discussion. Linking the material to reality.	Develop a question plan, set questions, and conduct daily quizzes.
10	2	Understand heat capacity at constant pressure and volume, and comparison	C_p and C_v relationship, calculation of C_p and C_v for ideal gases, work done by ideal gases	Using PDF lectures, employing QR barcode technology, using artificial intelligence questions, research and discovery, and creative thinking. Smartboard	Develop a question plan, set questions, and conduct daily quizzes.

				discussion. Linking the material to reality.	
11	2	Understand ideal gas pressure	Ideal gas pressure, solved examples, problems	Using PDF lectures, employing QR barcode technology, using artificial intelligence questions, research and discovery, and creative thinking. Smartboard discussion. Linking the material to reality.	Develop a question plan, set questions, and conduct daily quizzes.
12	2	Conduct an experiment to calculate specific weight and surface tension	Liquids: density and specific weight, capillarity, surface tension	Using PDF lectures, employing QR barcode technology, using artificial intelligence questions, research and discovery, and creative thinking. Smartboard discussion. Linking the material to reality.	Develop a question plan, set questions, and conduct daily quizzes.
13	2	Understand viscosity	Liquid surface, contact angle, viscosity, pressure in liquids	Using PDF lectures, employing QR barcode technology, using artificial intelligence questions, research and discovery, and creative thinking. Smartboard discussion. Linking the material to reality.	Develop a question plan, set questions, and conduct daily quizzes.
14	2	Interpret Pascal's and Archimedes' principles	Pascal's law, Archimedes' principle, laminar and steady flow	Using PDF lectures, employing QR barcode technology, using artificial intelligence questions, research and discovery, and creative thinking. Smartboard discussion. Linking the material to reality.	Develop a question plan, set questions, and conduct daily quizzes.

15	2		Second exam for the first semester		
16	2	Interpret Bernoulli's, Torricelli's, and Poiseuille's equations	Poiseuille's law, Bernoulli's equation, Torricelli's law	Using PDF lectures, employing QR barcode technology, using artificial intelligence questions, research and discovery, and creative thinking. Smartboard discussion. Linking the material to reality.	Develop a question plan, set questions, and conduct daily quizzes.
17	2	Learn about flow measurement devices	Flow meters, Venturi meter, Pitot tube	Using PDF lectures, employing QR barcode technology, using artificial intelligence questions, research and discovery, and creative thinking. Smartboard discussion. Linking the material to reality.	Develop a question plan, set questions, and conduct daily quizzes.
18	2	Practice solving questions	Solved examples, problems	Using PDF lectures, employing QR barcode technology, using artificial intelligence questions, research and discovery, and creative thinking. Smartboard discussion. Linking the material to reality.	Develop a question plan, set questions, and conduct daily quizzes.
19	2	Learn about stress types and elasticity, calculate Young's modulus and elasticity modulus	Mechanical properties of materials: stress and strain types, stress-strain curve, elasticity modulus, Young's modulus, experimental determination of Young's modulus	Using PDF lectures, employing QR barcode technology, using artificial intelligence questions, research and discovery, and creative thinking. Smartboard discussion. Linking the material to reality.	Develop a question plan, set questions, and conduct daily quizzes.

20	2	Conduct an experiment to determine Poisson's ratio	Poisson's ratio, experiment, relation between mechanical properties and temperature	Using PDF lectures, employing QR barcode technology, using artificial intelligence questions, research and discovery, and creative thinking. Smartboard discussion. Linking the material to reality.	Develop a question plan, set questions, and conduct daily quizzes.
21	2	Understand thermal processing operations	Thermal treatment at high and low temperatures, solved examples, problems	Using PDF lectures, employing QR barcode technology, using artificial intelligence questions, research and discovery, and creative thinking. Smartboard discussion. Linking the material to reality.	Develop a question plan, set questions, and conduct daily quizzes.
22	2		First exam of the second semester		
23	2	Learn about magnetic moment and electron angular momentum	Magnetic properties of materials, electron magnetic moment, angular momentum, their relationship	Using PDF lectures, employing QR barcode technology, using artificial intelligence questions, research and discovery, and creative thinking. Smartboard discussion. Linking the material to reality.	Develop a question plan, set questions, and conduct daily quizzes.
24	2	Compare diamagnetic, paramagnetic, and ferromagnetic properties	Magnetic susceptibility, classification of magnetic materials, diamagnetic, paramagnetic materials	Using PDF lectures, employing QR barcode technology, using artificial intelligence questions, research and discovery, and creative thinking. Smartboard discussion. Linking the material to reality.	Develop a question plan, set questions, and conduct daily quizzes.

25	2	Compare ferromagnetic, antiferromagnetic, and ferrimagnetic materials	Types of magnetic materials and their properties, magnetic elements, problems	Using PDF lectures, employing QR barcode technology, using artificial intelligence questions, research and discovery, and creative thinking. Smartboard discussion. Linking the material to reality.	Develop a question plan, set questions, and conduct daily quizzes.
26	2	Distinguish between insulators, semiconductors, and conductors	Electrical properties of materials: conductivity, types of materials (conductors, insulators, semiconductors)	Using PDF lectures, employing QR barcode technology, using artificial intelligence questions, research and discovery, and creative thinking. Smartboard discussion. Linking the material to reality.	Develop a question plan, set questions, and conduct daily quizzes.
27	2	Understand how temperature affects conductivity	Electrical conductivity and its temperature dependence, superconductivity, critical magnetic field	Using PDF lectures, employing QR barcode technology, using artificial intelligence questions, research and discovery, and creative thinking. Smartboard discussion. Linking the material to reality.	Develop a question plan, set questions, and conduct daily quizzes.
28	2	Learn about and thermal electrical breakdown	Electrical and thermal breakdown, factors affecting electrical insulation	Using PDF lectures, employing QR barcode technology, using artificial intelligence questions, research and discovery, and creative thinking. Smartboard discussion. Linking the material to reality.	Develop a question plan, set questions, and conduct daily quizzes.
29	2	Practice problem solving	Chapter review problems	Using PDF lectures, employing QR barcode technology,	Develop a question plan, set questions,

				using artificial intelligence questions, research and discovery, and creative thinking. Smartboard discussion. Linking the material to reality.	and conduct daily quizzes.
30	2		Second exam of the second semester		
11. Course Evaluation					
1- Review all previous semesters students have taken. 2- Fill out the review form and submit it to the relevant department committee.					
12. Learning and Teaching Resources					
Required textbooks			Heat and Material Properties – Dr. Kazem Ahmed Mohammed, University of Mosul Press, 1999.		
Main references			Thermodynamics - Fundamentals and Its Application in Science, Edited by Ricardo Morales-Rodriguez, ISBN 978-953-51-0779-8, 554 pages, Publisher: InTech, Chapters published October 03, 2012.		
Recommended books and references (scientific journals, reports...)			-Basic Physics: A Self-Teaching Guide (Wiley Self-Teaching Guides) by Karl F. Kuhn, John Wiley & Sons, 2005. - Physics: Principles with Applications (5th Edition) , Douglas C. Giancoli; Prentice Hall, 2005.		
Electronic References, Websites			https://www.youtube.com/watch?v=JmxKeptgpw https://www.youtube.com/watch?v=e1RVOc0VZ30 https://www.youtube.com/watch?v=PP9mn-X9i2Q https://www.youtube.com/watch?v=u36QpPvEh2c https://www.youtube.com/watch?v=1YBYHkkjvJI http://www.physicscentral.com/ http://www.physicsclassroom.com/		

Electricity and magnetism – First Level (Morning and Evening)

1. Course Name:
Electricity and magnetism
2. Course Code:
509080103
3. Semester / Year:
Annual/2024
4. Description Preparation Date:
30/10/2024
5. Available Attendance Forms:
Bachelor
6. Number of Credit Hours (Total) / Number of Units (Total)
90 hours
7. Course administrator's name (mention all, if more than one name)
1 – Prof. Dr. Ahmed Farhan Atwan 2– Prof. Dr. Hana Hassan Kareem
8. Course Objectives
Develop a deep understanding of the basic concepts in electricity and magnetism (e.g. charge, field, voltage, resistance, current, Kirchhoff's laws, Coulomb's law, Ampere's law, Faraday's law...).
Preparing the student to be an efficient teacher capable of communicating physical concepts using modern educational strategies.
Linking theoretical concepts with life and technical applications.

9. Teaching and Learning Strategies

Strategy

1. **Active Learning** Adopt techniques such as brainstorming, classroom discussions, and working in small groups. Practical examples: Analyzing simple circuits in groups, and providing various solutions to problems.
2. **Problem-Based Learning (PBL)** Provide realistic learning situations that require students to use physical concepts to solve them. Example: Design of an electrical circuit for feeding a household appliance under certain conditions.
3. **Inquiry-based learning** Conducting laboratory experiments to confirm physical laws such as Kirchhoff's law or Faraday's law. Strengthen the link between theory and practice through survey and analysis of results.
4. **Blended Learning** Integrate face-to-face education with e-learning through the use of videos, simulations, or programs such as PhET. Especially useful in abstract concepts such as electric and magnetic fields.
5. **Cooperative Learning** Distributing roles among students in completing tasks, such as: graphing, analysis, arithmetic, interpretation. Develops communication and teamwork skills.
6. **Project-based learning** Assigning students to simple projects such as designing a model for the transmission of electrical energy or explaining the principle of the electric motor.

10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Bachelor	Atom composition, electric charges, matter and charge, the law of conservation of charge, charging by conduction.	. Dialogue . Power point . E-Learning	Short questions at the end of the lecture
2	3	Bachelor	Conductors, insulators and semiconductors, Coulomb's law	. Dialogue . Power point . E-Learning	Short questions at the end of the lecture
3	3	Bachelor	Investigation of Coulomb's Law – The Nucleus of the Atom in the Rutherford Experiment – Unit Systems – Solutions to Chapter Questions and Problems	. Dialogue . Power point . E-Learning	Short questions at the end of the lecture
4	3	Bachelor	Electric field, calculation of electric field strength, dipolar field	. Dialogue . Power point . E-Learning	Short questions at the end of the lecture

5	3	Bachelor	The field relative to continuous charge distribution, wattage lines. KOS Law, Conclusions of CAOS's Law Regarding the Charge into the Connector	. Dialogue . Power point . E-Learning	Short questions at the end of the lecture
6	3	Bachelor	Conclusions from the law of CAOS with respect to the field outside a charged conductor, the domain of a charged plane and infinite, the domain of a plate conductor and unlimited area	. Dialogue . Power point . E-Learning	Short questions at the end of the lecture
7	3	Bachelor	, the field close to the outside of any charged conductor, the field between two parallel and charged conductor plates, Millican oil drop experience	. Dialogue . Power point . E-Learning	Short questions at the end of the lecture
8	3	Bachelor	Solving Chapter Questions and Problems, First Exam	. Dialogue . Power point . E-Learning	Short questions at the end

					of the lecture
9	3	Bachelor	Electrical potential energy, voltage, electric potential difference, charged conductive ball voltage	. Dialogue . Power point . E-Learning	Short questions at the end of the lecture
10	3	Bachelor	Power base, equipotential surfaces, voltage gradient, charge sharing by conductors, Van de Kraf generator	. Dialogue . Power point . E-Learning	Short questions at the end of the lecture
11	3	Bachelor	Solve chapter questions and problems	. Dialogue . Power point . E-Learning	Short questions at the end of the lecture
12	3	Bachelor	Electrical Capacitors, Parallel two-plate dilators, Connecting capacitors in parallel and in series, Effect of insulators on capacitance	. Dialogue . Power point . E-Learning	Short questions at the end of the lecture
13	3	Bachelor	Polarization vector, electric displacement vector, energy stored in	. Dialogue . Power point . E-Learning	Short questions at the end

			capacitors, dielectric and permeability coefficient, molecular theory of different charges on the dielectric		of the lecture
14	3	Bachelor	Solving Chapter Questions and Problems, Second Exam	. Dialogue . Power point . E-Learning	Short questions at the end of the lecture
15	3	Bachelor	Current, full circuit, specific resistance, resistance and Ohm's law, standard, constant and variable resistance	. Dialogue . Power point . E-Learning	Short questions at the end of the lecture
16	3	Bachelor	Resistance change with temperature, current measurement, potential difference and resistance, current density, Wetstone bridge	. Dialogue . Power point . E-Learning	Short questions at the end of the lecture
17	3	Bachelor	Current rate and its acting value, solving separation questions and problems	. Dialogue . Power point . E-Learning	Short questions at the end

					of the lecture
18	3	Bachelor	DC circuits emf , circuit equation, potential difference between points in an electrical circuit	. Dialogue . Power point . E–Learning	Short questions at the end of the lecture
19	3	Bachelor	Voltage of the terminals of the emf source, voltage distributor (voltage), connecting resistors in series and in parallel	. Dialogue . Power point . E–Learning	Short questions at the end of the lecture
20	3	Bachelor	Circuits containing sources of electromotive force, Kirchhoff's laws, power, power measurement and energy	. Dialogue . Power point . E–Learning	Short questions at the end of the lecture
21	3	Bachelor	Solving Chapter Questions and Problems, Third Exam	. Dialogue . Power point . E–Learning	Short questions at the end of the lecture
22	3	Bachelor	Thermoelectric and chemical motive force. Electrode voltage,	. Dialogue . Power point . E–Learning	Short questions at the end

			electrical cells, Daniel cell, Lachlanchet cell		of the lecture
23	3	Bachelor	Polarization, dry cell. Lead storage battery, standard cells, electrolysis, electrolysis, electrolysis, thermoelectric energy. Thomson's Electromotive Force	. Dialogue . Power point . E-Learning	Short questions at the end of the lecture
24	3	Bachelor	Peltair's motive force, SEPAC's electromotive force, Thomson effect. Adopt temperature emf power, thermocouple	. Dialogue . Power point . E-Learning	Short questions at the end of the lecture
25	3	Bachelor	The basic equation of thermocouple and its applications, solving separation questions and problems	. Dialogue . Power point . E-Learning	Short questions at the end of the lecture
26	3	Bachelor	Magnetic field, magnetic field, inductance, induction lines, magnetic flux, charge orbits in magnetic fields Power on a moving charge, Cyclotron, the	. Dialogue . Power point . E-Learning	Short questions at the end of the lecture

			force on a current-carrying conductor, cast it and moment into a perfect circle in the form of a rectangle – in the form of a circle, Solinoid-shaped		
27	3	Bachelor	Magnetic moment acting on electric current, the motion of a charged body in two electric and magnetic fields perpendicular to each other	. Dialogue . Power point . E-Learning	Short questions at the end of the lecture
28	3	Bachelor	Speed filter, mass spectrometer, Hall effect	. Dialogue . Power point . E-Learning	Short questions at the end of the lecture
29	3	Bachelor	Solving Chapter Questions and Problems, Fourth Exam	. Dialogue . Power point . E-Learning	Short questions at the end of the lecture
30	3	Bachelor	Comprehensive review	. Dialogue . Power point . E-Learning	Short questions at the end

					of the lecture
11. Course Evaluation					
12. Learning and Teaching Resources					
Required textbooks			Electricity and Magnetism Yahya Abdul Hamid Ali, University of Mosul 1990		
Main references					
Recommended books and references (scientific journals, reports...)			University Physics Part Two (Electricity and Magnetism) Dr. Rahim Abdul Karim, Dr. Abdul Salam Abdul Amir, Dr. Talib Nahi Al-Khafaji, Fayyad Abdul Latif 1986.		
Electronic References, Websites					

Mechanics – First Level (Morning and Evening)

1. Course Name:
Mathematical 1
2. Course Code:
509080104 PHMTI
3. Semester / Year:
Annual/2025
4. Description Preparation Date:
30/10/2024
5. Available Attendance Forms: Bachelor
6. Number of Credit Hours (Total) / Number of Units (Total)
7. Course administrator's name (mention all, if more than one name)
1 – Prof. Dr. Mohamad Jawad Yaseen
2– A. Prof. Dr. Abbas Ali Abbas
8. Course Objectives
1 .Teach the student the concept of derivatives, tangents and the derivative at a point, and the derivative as a function
2 .How to deal with derivative rules and the derivative as a rate of change
3 .Define the derivative of a composite function (the chain rule)
4 .Types of second and higher–order derivatives, and implicit differentiation
5 .How to find the derivatives of trigonometric functions
.6 Finding the derivatives of the inverse of trigonometric functions
.7 The derivative of the natural logarithm function and its types, and the derivatives of exponential functions and their types
.8 Identifying the derivatives of hyperbolic functions

.9 The derivatives of the inverse of hyperbolic functions					
.10 Indeterminate formulas and L'Hospital's rule					
.11 Applications of the derivative, the derivative, the slope, and the tangent line, increasing functions, decreasing functions, and constant functions					
.12 First derivative test for local extreme values, concavity, second derivative test for concavity					
13. Inflection points, antiderivatives					
9. Teaching and Learning Strategies					
Strategy		Type something like: The main strategy that will be adopted in delivering this module is to encourage students’ participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.			
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	1. Understanding the derivative, its rules, and types	The rate of change of function, Coordinates for the Plan	Using PDF lectures, employing QR barcode technology, using artificial intelligence questions, research and discovery, and creative thinking. Smartboard discussion. Linking the material to reality.	Develop a question plan, set questions, and conduct daily quizzes.

2	3	2. Understanding how to differentiate trigonometric, logarithmic, and exponential functions and their types	a.	Using PDF lectures, employing QR barcode technology, using artificial intelligence questions, research and discovery, and creative thinking. Smartboard discussion. Linking the material to reality.	Develop a question plan, set questions, and conduct daily quizzes.
3	3	3. Understanding the inverse derivative of trigonometric and hyperbolic functions	Equation of a straight line.	Using PDF lectures, employing QR barcode technology, using artificial intelligence questions, research and discovery, and creative thinking. Smartboard discussion. Linking the material to reality.	Develop a question plan, set questions, and conduct daily quizzes.
4	3	4. Understanding indeterminate forms and L'Hospital's rule	Function and graphs	Using PDF lectures, employing QR barcode technology, using artificial intelligence questions, research and discovery, and creative thinking. Smartboard discussion. Linking the material to reality.	Develop a question plan, set questions, and conduct daily quizzes.
5	3	5. Understanding the applications of the derivative	a.	Using PDF lectures, employing QR barcode technology, using artificial intelligence questions, research and discovery, and creative thinking. Smartboard discussion. Linking the material to reality.	Develop a question plan, set questions, and conduct daily quizzes.

6	3	6. Understanding inflection points and antiderivatives	b.	Using PDF lectures, employing QR barcode technology, using artificial intelligence questions, research and discovery, and creative thinking. Smartboard discussion. Linking the material to reality.	Develop a question plan, set questions, and conduct daily quizzes.
7	3				
8	3		The slope of the curve $y=f(x)$: Derivatives	Using PDF lectures, employing QR barcode technology, using artificial intelligence questions, research and discovery, and creative thinking. Smartboard discussion. Linking the material to reality.	Develop a question plan, set questions, and conduct daily quizzes.
9	3		Velocity and other Rates of change	Using PDF lectures, employing QR barcode technology, using artificial intelligence questions, research and discovery, and creative thinking. Smartboard discussion. Linking the material to reality.	Develop a question plan, set questions, and conduct daily quizzes.
10	3		Limits and Infinity , امتحان	Using PDF lectures, employing QR barcode technology, using artificial intelligence questions, research and discovery, and creative thinking. Smartboard discussion. Linking the material to reality.	Develop a question plan, set questions, and conduct daily quizzes.

11	3		Derivatives of algebraic functions , Polynomial functions and their Derivatives	Using PDF lectures, employing QR barcode technology, using artificial intelligence questions, research and discovery, and creative thinking. Smartboard discussion. Linking the material to reality.	Develop a question plan, set questions, and conduct daily quizzes.
12	3			Using PDF lectures, employing QR barcode technology, using artificial intelligence questions, research and discovery, and creative thinking. Smartboard discussion. Linking the material to reality.	Develop a question plan, set questions, and conduct daily quizzes.
13	3		Derivatives of Products, powers and Quotients , Implicit Differentiation and fractional powers .	Using PDF lectures, employing QR barcode technology, using artificial intelligence questions, research and discovery, and creative thinking. Smartboard discussion. Linking the material to reality.	Develop a question plan, set questions, and conduct daily quizzes.
14	3		a.	Using PDF lectures, employing QR barcode technology, using artificial intelligence questions, research and discovery, and creative thinking.	Develop a question plan, set questions, and conduct daily quizzes.

				Smartboard discussion. Linking the material to reality.	
15	3		Functions of the chain Rule. Continuity , امتحان		
16	3		a.	Using PDF lectures, employing QR barcode technology, using artificial intelligence questions, research and discovery, and creative thinking. Smartboard discussion. Linking the material to reality.	Develop a question plan, set questions, and conduct daily quizzes.
17	3		Derivatives of trigonometric functions , Parametric equations. Newton, s methods for approximating roots of equations	Using PDF lectures, employing QR barcode technology, using artificial intelligence questions, research and discovery, and creative thinking. Smartboard discussion. Linking the material to reality.	Develop a question plan, set questions, and conduct daily quizzes.
18	3			Using PDF lectures, employing QR barcode technology, using artificial intelligence questions, research	Develop a question plan, set questions, and conduct

				and discovery, and creative thinking. Smartboard discussion. Linking the material to reality.	daily quizzes.
19	3		Application of Derivatives	Using PDF lectures, employing QR barcode technology, using artificial intelligence questions, research and discovery, and creative thinking. Smartboard discussion. Linking the material to reality.	Develop a question plan, set questions, and conduct daily quizzes.
20	3		Increasing or decreasing function : the sign of dy/dx . , Significance of the sign of the second derivative.	Using PDF lectures, employing QR barcode technology, using artificial intelligence questions, research and discovery, and creative thinking. Smartboard discussion. Linking the material to reality.	Develop a question plan, set questions, and conduct daily quizzes.
21	3		a.	Using PDF lectures, employing QR barcode technology, using artificial intelligence questions, research and discovery, and creative thinking. Smartboard discussion. Linking the material to reality.	Develop a question plan, set questions, and conduct daily quizzes.

22	3		a.		
23	3		امتحان , The inverse Trigonometri c. Transcenden tal Functions	Using PDF lectures, employing QR barcode technology, using artificial intelligence questions, research and discovery, and creative thinking. Smartboard discussion. Linking the material to reality.	Develop a question plan, set questions, and conduct daily quizzes.
24	3		Inverse Functions.	Using PDF lectures, employing QR barcode technology, using artificial intelligence questions, research and discovery, and creative thinking. Smartboard discussion. Linking the material to reality.	Develop a question plan, set questions, and conduct daily quizzes.
25	3		Functions	Using PDF lectures, employing QR barcode technology, using artificial intelligence questions, research and discovery, and creative thinking. Smartboard discussion. Linking the material to reality.	Develop a question plan, set questions, and conduct daily quizzes.
26	3		a.	Using PDF lectures, employing QR barcode technology, using artificial intelligence questions, research and discovery, and creative thinking. Smartboard discussion. Linking the material to reality.	Develop a question plan, set questions, and conduct daily quizzes.

27	3		Properties of Natural logarithms, the graph of $y=\ln x$	Using PDF lectures, employing QR barcode technology, using artificial intelligence questions, research and discovery, and creative thinking. Smartboard discussion. Linking the material to reality.	Develop a question plan, set questions, and conduct daily quizzes.
28	3		a.	Using PDF lectures, employing QR barcode technology, using artificial intelligence questions, research and discovery, and creative thinking. Smartboard discussion. Linking the material to reality.	Develop a question plan, set questions, and conduct daily quizzes.
29	3		b.	Using PDF lectures, employing QR barcode technology, using artificial intelligence questions, research and discovery, and creative thinking. Smartboard discussion. Linking the material to reality.	Develop a question plan, set questions, and conduct daily quizzes.
30	3		The function $y=\log u a$, Applications of Exponential and logarithmic functions	Using PDF lectures, employing QR barcode technology, using artificial intelligence questions, research and discovery, and creative thinking. Smartboard discussion. Linking the material to reality.	Develop a question plan, set questions, and conduct daily quizzes.

11. Course Evaluation	
1 -Review all previous semesters students have taken.	
2– Fill out the review form and submit it to the relevant department committee.	
12. Learning and Teaching Resources	
Required textbooks	Calculus with Analytic Geometry by Gerorg F.Simmoms (second addition)
Main references	THOMAS' CALCULUS' Early Transcendentals FIFTEENTH EDITION
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	Provides Internet service, the social networking program Telegram, and the virtual classroom Google Classroom

English – First Level (Morning and Evening)

Course Name: .1	
English	
Course Code: .2	
509080105	
Semester / Year: .3	
Annual/2024	
Description Preparation Date: .4	
30/10/2024	
Available Attendance Forms: Bachelor .5	
Number of Credit Hours (30) / Number of Units (12) .6	
Course administrator's name (mention all, if more than one name) .7	
1 – Prof. Dr. Zina Abdali 2– Asst. Lect. Nora Abdalnabi	
Course Objectives .8	
1. Communicate in basic everyday situations 2. Understand and use essential English grammar 3. Develop foundational vocabulary 4. Practice the four core skills (Listening/Speaking/Reading/Writing) 5. Build learner confidence in using English. 6. Prepare for next-level English courses.	
Teaching and Learning Strategies .9	
Strategy	

To meet the course objectives and learning outcomes, this course uses a communicative, student-centered approach supported by the structure of Headway Plus Beginner (Oxford). The strategies include: 1. Communicative Language 2.Task-Based Learning 3. Skills Integration 4. Visual and Audio Aids 5. Repetition and Controlled Practice 6. Peer Interaction and Group Work 7. Continuous Feedback and Correction					
Course Structure .10					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	1	Greetings, simple introductions	Hello!	Dialogues	vocabulary drills Quiz
2	1	verb “be”, numbers 1–10	Hello	role-play	oral intro activity
3	1	nationalities, basic question forms	Your World Countries	Map tasks	listening W

					ritten quiz
4	1	possessive adjectives	Your World Count ries	Q&A practice	pair Q&A
5	1	Personal info, jobs.	All About You	role-plays	Short written bio
6	1	social expressions Interview	All about You	text comprehension	speakin g
7	1	Exam			
8	1	Possessive 's, family terms	Family & Friends	Listening phone dialogues	Vocab quiz
9	1	telephone vocabulary	Family & Friends	family tree task	listening test
10	1	Present simple	Things I Like!	Survey and report on preferences	Speakin g present ation
11	1	like/love/hate + noun phrases	Things I Like!	Writing	quiz
12	1	Present simple with adverbs of frequency scheduling activities	Every Day	daily routines	Listenin g

13	1	adverbs of frequency	Every Day	Diary–writing	written task
14	1	Exam			
15	1	Object pronouns, question words	Favourite Things	Role–play:shopping	Quiz
16	1	description of places/objects	Favourite Things	Role–play:preferences	pair dialogues
17	1	There is/are Room description	Home Sweet Home	furniture placement task	Oral description
18	1	furniture, prepositions of place	Home Sweet Home	furniture placement task	quiz
19	1	Was/were, past simple: irregular verbs.	Past Times	Sequence picture	Spoken narrative
20	1	telling date/year stories	Past Times	storytelling	grammar check
21	1	Past simple in Q&A, negatives,	We Had a Great Time!	Holiday recount	Writing task
22	1	time expressions	We Had a Great Time	role–play	speaking quiz
23	1	Exam			
24	1	Can/can’t, talking about abilities	We Can Do It!	Class survey,	Listening quiz

25	1	requests/offers	We Can Do It!	ability interview skits	peer speaking
26	1	Politeness formulae	Thank You Very Much!	Dialogue practice	role-play
27	1	like/do you mind, expressions of thanks	Thank You Very Much!	writing short messages	writing task
28	1	Exam			
29	1	broad grammar	Integrated Review	guest-speaker Q&A	Class discussion
30	1	Mixed skills	Integrated Review	skills tasks	self-assessment
Course Evaluation .11					
Mini Exams Weekly Quizzes Speaking Tasks Writing Tasks Class interaction Homework correction Pair and group work observation Oral feedback after activities					
Learning and Teaching Resources .12					
Required textbooks			Headway Plus Beginner		
Main references			Headway Plus Beginner: Student Book Headway Plus Beginner: Activity Book		

Recommended books and references (scientific journals, reports...)	Interchange: First Level (Cambridge University)
Electronic References, Websites	https://www.cambridgeenglish.org https://www.youtube.com/user/bbclear ningenglish

Form Description of the course

1. :Course Name
Science Educational self
2. :Code Code
509080106
3. :Chapter / Year
Annual2024-2025
4. :Date of preparing this description
2024/10 /12
5. Available Attendance: Monthly
6. :Number of study hours (total) / number of units (total)
hoursPer month/4Unit (per month) 48
7. The name of the course administrator (if more than one name)
Name:Ad. Dr.. Duaa Esman Abdullah Naama/ M. Ad. Waleed Ghanem :Emailldr.duea_eidan@uomustansiriyah.edu.iq
Goals .8
Knowledge goalsAndFor educational psychologyRecognitionEducational ,psychology,Objectives of educational psychology bjectivesTechnical skillsEarn student skills of scientific researcher and work • • ne objectives of the subject

on transport and presentation of informationOwnPsychology ucational(Research and reports), as well as the use of smart electronic means .to develop skillsStudent in teaching methods Occasional goals development of student ability to take responsibility during • periodStudy and workUponEncourage theStudent on helping his .friendsAndSelf-assurance						
Education and learning strategies .9						
.The use of modern teaching strategies (cognitive strategies and above) .1 .Use modern educational models in teaching .2 The mandate of the student with some home activities and duties, including .3 .process reports and presented them to his colleagues in the lecture .Customize a degree ratio for extracurricular activities .4 The Department of Lecture is in a way that students feel the importance of organizing time					The strategy	
Course structure .10						
Evaluation method	Learning method	The name of the unit or subject	Learning outcomes required	الساعة	The week	
Written .1 tests Oral tests .2 Daily tests .3 التقارير .4	How .1 to throw lectures محاضر .2 Video .3	Course vocabulary by chedule (practical + myor)	Cognitive goals: It is thatTheUnderstandingThe studentMahAndEducational psychologyAnd how it is .studied	2	The first	
		The concept ofEducational psychology., Attention, cognition		2	e second	
		Remember and its types	Mathematical goals: Can the identTVsTheR.PhenomenaEd	2	The third	
		Forgetfulness (Mah,		2	he fourth	

	Docu- mentary films 4. Snapshot s	(theories Thinking (I, Development)	ationalAndAThey are factors thatWhichAffect theThe .student	2	The fifth
		error (definition, functions, (classification, importance	Skill المهارة: It is onlyScorer using scientific research skills	2	VI
		ransmission of learning (I, importance, educational (applications	occasional goals Development of student ability to take responsibilitiesTEAnd help .students	2	The seventh
		The first exam is monthly		2	VIII
		eedback, its concept, their ,, ,, importance		2	The ninth
		Learning (objectives, (characteristics,Conditions		2	The tenth
		Learning theories (ثورندايك,Pavlov,Skinner)		2	Eleventh
		earn the concept (methods, (affected factors		2	Twelveth
		Individual differences importance, اسبابه, types) (how to take into account		2	hirteenth
		Motivation		2	ourteenth
				2	
		The second exam		2	Fifteenth

		Memory (types, ways to (strengthen them		2	Sixteen
		Learning (concept, (importance		2	Seventeenth
		Education (concept, forms)		2	Eighteen
		Strategy for motivation		2	Nineteenth
		Sneaky		2	The twentieth
		Search curriculum in educational psychology		2	Twenty one
		Third exam		2	
		Factors affecting behavior		2	Twenty two
		Behavior (definition, I am)		2	Twenty- third
		Historical development of self-science		2	Twenty- fourth
		Psychological development of self-science		2	Twenty- fifth
		Psychological experiments		2	The twenty- sixth
		The most important educational problems		2	Twenty- seventh

		ExamThird monthly	2	
		Causes of studying	2	Twenty-eighth
		Low level (causes, (treatment	2	Twenty-ninth
		Fourth exam	2	XXX
Final exam				
Assessment of the course 11.				
Distribution of grade from 100 on tasks charged with student such as daily preparation, daily, oral, monthly, library and reports The first semester exam is 20 degreesThe second chapter exam is 20 ° Annual pursuit 40 degrees Activities and tests Daily, monthly exams and daily preparations final exam 60 degrees				
Sources of learning and teaching 12.				
There is no		The required books required (Methodology to (find		
Fadel Mohsen(1991):Book of Books for *الازيرجاوي, .Printing and Publishing, University of Mosul phiReligion,Lentils and lentils, AbdulRahman (1983): * .Basic educational psychology Wissam Tawfiq (2014): *والمشهداني, Ali, Ismail Ibrahim * Learning and Thinking Methods, I 1, Qandil Printing,		President (sources)		

.Publishing and Distribution, Amman, Jordan *الزغول, Ahmad Abdel Rahim (2003): Learning Theories, Dar Al Shorouk Publishing and Distribution, Amman, .Jordan	
Wissam Tawfiq (2014): والمشهداني, Ali, Ismail Ibrahim * Learning and thinking methods, i 1, Qandil Printing, Publishing and Distribution, Amman, Ar	Books and references are recommended (... scientific journals, reports)
There is no	Electronic references, internet sites

Foundations of Education – First Level (Morning and Evening)

1. Course Name:
Foundations of Education, First Stage
2. Course Code:
50901107
3. Semester / Year:
Annual
4. Description Preparation Date:
30/10/2024
5. Available Attendance Forms: Bachelor
In-person/Weekly
6. Number of Credit Hours (Total) / Number of Units (Total)
Number of Hours: 90 Hours / Number of Units: 180
7. Course administrator's name (mention all, if more than one name)
Asst. Ahmed Mohamed Ahmed/ Sabahy Asst. Zainab Mohamed Saber Sultan/ Masaei zainabalsaidnoor@uomustansiriyah.edu.iq
8. Course Objectives
Introduce the student to the concept of the foundations of education Explain the importance of the foundations of education Compare ancient and modern education - Determine the cultural foundations of education -

The student achieves integration between the media of Arab and Western educational thought					
The student evaluates the philosophical foundations of education					
Teaching and Learning Strategies					
9. Teaching and Learning Strategies					
Strategy	Research and Exploration .				
	Feedback				
	Written Storming				
	Brainstorming				
	Discussion and Dialogue				
	Metacognitive Thinking				
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Cognitive Objectives	Education: Definition, Objectives, and	GroupsDiscussion	Written Exams

			Characteristics		
2	3	After Completing the Course The student will have information about the foundations of its concept) justifications, steps of education, its priorities, and requirements	The pillars of education, its importance, necessity, and foundations	Documentary Films	Oral Exams
3	3	Students learn how to lay the appropriate foundations by following the necessary steps Historical Foundations of Education Video Lectures Daily Tests	Historical Foundations of Education	Video Lectures	Daily Tests

4	3	Helps students set future goals and objectives through education	Primitive Societies	Giving Lectures	Reports
5	3	Skill Objectives	Ancient Chinese Civilization		
6	3	Teaching learners to acquire information	Mesopotami an Civilization		
7	3	Training learners to apply the steps of .scientific foundations	Arab Civilization Before and After Islam		
8	3	modern using technological techniques in developing modern methods	Education in the Shadow of Islamic Civilization		
9	3	Affective Objectives	Educational Islamic Media of Thought		

10	3	Ensuring student interaction.	Social Foundations of Family Education		
11	3	Generating excitement for students	Social Foundations of Education Society		
12	3		The Importance of Education for the individual		
13	3		The Importance of Education for Society		
14	3		Philosophical Foundations of Education		
15	3		First Semester Exam		
16	3		The Relationship of		

			Philosophy to Education		
17	3		Economic Foundations of Education		
18	3		Education and its Role in Economic Developmen		
19	3		Education and its Role in Human Developmen		
20	3		Scientific Foundations of Education		
21	3		and Its Education, Ecucalion, Relationship to Society		
22	3		Education and Technologic al Progress		

23	3		Modern Foundations of Education		
24	3		Media of Western Thought		
25	3		Cultural Foundations of Education		
26	3		Culture, Its Concept, and Origins		
27	3		Chinese and Greek Education		
28	3		Education and the Scientific Method		
29	3		Philosophica Schools of Education		

30	3		Second Semester Exam		
11. Course Evaluation					
Distribution of marks out of 100 according to the tasks assigned to the student, such as daily preparation, daily, oral, and monthly exams .Written work, reports, etc Annual Attempt Mark 40 Second Semester Exam 20 First Semester Exam 20 marks Marks Final Exam 60 marks Activities and Tests Daily and Monthly Exams and Daily Preparation					
12. Learning and Teaching Resources					
Required textbooks			Foundations of Education Book		
Main references			Nasser, Ibrahim, (2001) Philosophy of Education		
Recommended books and references (scientific journals, reports...)			Ahmed El-Tayeb / Principles of Education 1990 Ahmed El-Tayeb / Principles of .Education 1990		

	Scientific, reports...
/https://edu-women.aliraqia.edu.iq	

Human Rights and Democracy - First Level (Morning and Evening)

1. Course Name:	
Human Rights and Democracy	
2. Course Code:	
509080109	
3. Semester / Year:	
Annual/2024	
4. Description Preparation Date:	
16/7/2025	
5. Available Attendance Forms: Bachelor	
Attendance/Weekly	
6. Number of Credit Hours (Total) / Number of Units (Total)	
Number of hours: 90 hours / Number of units: 180	
7. Course administrator's name (mention all, if more than one name)	
1 - Asst. Dr. Intisar Abd Aoun Mohsen Hassan 2-Asst. M.Sc. Wafaa Zayed Abbas	
8. Course Objectives	
A. Enabling students to understand the concept of human rights, their characteristics, and roots. B. Enabling students to understand the distinction between rights and duties. C. Enabling students to understand the nature and types of freedoms. C. Enabling students to understand the meaning of democracy, its characteristics, and its historical development. C. Enabling students to understand crimes committed against human rights. H. Enabling students to understand the terminology associated with human rights and democracy. G. Educating students to respect human dignity. D. Developing students' sense of responsibility during their studies and work. I. Developing students' sense of belonging and loyalty to their homeland.	
9. Teaching and Learning Strategies	
Strategy	A. The introductory method. B. Using PowerPoint lectures. C. Using screens and smart boards to present academic material. D. Reports and projects E. Oral discussions. F. Classroom and extracurricular assignments. G. Workshops.

10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1		Enabling students to understand the historical development of human rights and their characteristics.	Human Rights and Their Historical Development	The recitation method	Written essay or objective tests are conducted quarterly or monthly.
2		Enabling students to understand human rights in divine laws	Human Rights in Divine Laws	Discussion Method	Grading is awarded for daily participation
3		Students will understand the contemporary recognition of human rights..	Contemporary Recognition of Human Rights	Curricular and Extracurricular Assignments	Grading is awarded for daily participation
4		Students will understand the contemporary recognition of human rights	Contemporary Recognition of Human Rights	Explanation and Clarification	Grading is awarded for daily participation
5		Students will distinguish between human rights in Greek and Roman civilizations.	Human Rights in Greek Civilization	Reports and Projects	Awarding grades for research and reports related to the lecture topic
6		The student will be able to distinguish between human rights in Greek and Roman civilizations.	Roman Civilization	Educational story method	interrogation

7		The student will be able to distinguish between human rights in different civilizations.	Indian and Chinese Civilizations	Educational story method	interrogation
8		The student's understanding of human rights in Islam is the foundation of human rights.	Human Rights in Islam	The recitation method	Awarding grades for attendance and regularity in lectures.
9		The student's understanding of human rights during the era of Imam Ali (peace be upon him) is one of the most important eras in Islam.	The Era of Imam Ali (peace be upon him)	Oral discussions	Conducting agreed-upon or unagreed-upon daily exams
10		Developing students' skills in understanding the importance of the covenant in the field of human rights.	The Importance of the Covenant in the Field of Human Rights	Reports and projects	Awarding grades for research and reports related to the lecture topic
11		Training students' skills in distinguishing and recognizing the importance of the message of rights by Imam Ali ibn al-Husain.	The Message of Rights by Imam Ali ibn al-Husayn	Reports and projects	Awarding grades for research and reports related to the lecture topic
12		Empowering students to understand the most important rights emphasized in the Treatise of Rights by	The most important rights emphasized in the Treatise on	Curricular and extracurricular assignments	Oral exam

		Imam Ali ibn al-Husain.	Rights by Imam Ali ibn al-Husayn		
13		Developing students' skills in understanding the importance of the American Declaration of Independence of 1776 in the field of human rights.	The American Declaration of Independence in 1776	Form a discussion group during the lecture	Interrogation
14		To enable students to understand the historical importance of recognizing human rights.	Recognition of Human Rights	The recitation method	Oral Examinations
15		To enable students to understand the extent of commitment to human rights principles during international and regional conflicts	Universal Declaration of Human Rights	The recitation method	Written tests
16		To familiarize students with the concept of genocide.	Genocide	The recitation method	Written tests
17		To understand the most important causes of genocide and its international prevention.	Preventing Genocide	Oral discussions	Awarding grades for daily participation
18		To enable students to critique and analyze the genocide in Iraq	Genocide in Iraq	Classroom and Extracurricular Assignment	Awarding grades for daily participation

19		To enable students to understand the violations of political rights in Iraq..	Violations of Political Rights in Iraq	Using PowerPoint Lectures	Awarding grades for daily participation
20		To familiarize students with the issue of the forced displacement of the Faylee Kurds and its consequences	Forced Displacement of Fayli Kurds	The recitation method	Awarding grades for attendance and regularity in lectures
21		To familiarize students with the most significant violations against the Turkmen.	Violations Against Turkmen	Reports and Projects	Awarding grades for research and reports related to the lecture topic
22		Training students to acquire analysis skills in past events	Mass graves of victims of the former Ba'ath regime	Curricular and extracurricular assignments	Awarding grades for daily participation
23		Enabling students to understand the causes of the crime of draining the marshes in southern Iraq.	The crime of draining the marshes in southern Iraq	Reports and Projects	Awarding grades for research and reports related to the lecture topic
24		Students should understand the main causes of corruption to avoid them in the future.	Administrative corruption: its causes and manifestations	Using PowerPoint Lectures	Awarding grades for attendance and regularity in lectures
25		Students should understand the history and origins	The concept of democracy	The recitation method	Oral exam

		of democracy	and its characteristics		
26		Enabling students to understand the concept of sovereignty and its characteristics	Sovereignty and the Characteristics of Sovereignty	Oral discussions	Oral exam
27		The student should know the most important freedoms that he should enjoy.	National Freedom	The recitation method	Oral exam
28		The student will distinguish between human rights and democracy in the era of Plato and Aristotle..	Human Rights in the Era of Plato and Aristotle	The recitation method	Awarding grades for daily participation
29		The student will discover the most important obstacles to democracy.	Obstacles to Democracy	Oral discussions	Awarding grades for attendance and regularity in lectures
30		The student will be able to learn the basics of the electoral system and the constitution	Electoral system and constitution	Reports and Projects	Awarding grades for research and reports related to the lecture topic

11.Course Evaluation

1. The course covered essential topics (such as the concept of human rights and its historical development, the Universal Declaration of Human Rights, international protection mechanisms, democratic governance systems, and contemporary challenges.
2. The course provided a comprehensive analysis of the challenges facing democracy worldwide.
3. The lecture and discussion methods were the best ways to help students understand the principles of democracy.

4. Students were able to learn the skills of dialogue, debate, listening to others, and accepting their opinions.
5. Students became better able to analyze human rights events, and their participation in discussions increased.
6. Recent references and books were available.
7. Classroom discussions helped students better understand the issues raised.
8. The course contributed to changing students' perceptions of their rights and responsibilities.
9. Suggest improvements, such as partnering with local organizations to organize field workshops or organizing a seminar on press freedom.

12. Learning and Teaching Resources

Required textbooks	Human rights and democracy
Main references	Various books that talk about human rights in addition to Quranic texts
Recommended books and references (scientific journals, reports...)	Human Rights and Democracy (Concepts and Foundations), Samah Mahdi Al-Aliawi
Electronic References, Websites	ps://faculty.uobasrah.edu.iq/uploads/teaching/1685208561.pdf

Computer – First Level (Morning and Evening)

1. Course Name:	
Computer Science	
2. Course Code:	
509080110	
3. Semester / Year:	
Annual/2024– 2025	
4. Description Preparation Date:	
30/10/2024	
5. Available Attendance Forms: Bachelor	
Monthly	
6. Number of Credit Hours (Total) / Number of Units (Total)	
4	
7. Course administrator's name (mention all, if more than one name)	
1 – Dr. Mohanad Ridha Ghanim	
2. Haitham Slman Chyad	
8. Course Objectives	
- Enable students to understand the stages of computer development.	
- Enable students to identify the basic components of a computer (hardware and software).	- Enable students to distinguish between types of operating systems and their uses.
- Enable students to use software legally and securely, and understand how to protect their computers from security breaches such as viruses.	- Enable students to learn about using Windows 7 and its applications.
9. Teaching and Learning Strategies	
Strategy	2. Use modern educational models in teaching. 3. Assign students some activities and homework, including practical reports to present to their classmates.

		4. Allocate a percentage of the grade for extracurricular activities. 5. Manage practical sessions in a way that makes students aware of the importance of time management.			
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2				
1	2		Introduction to computers, stages of computer development	1. Lecture method 2. Video lectures 3. Documentaries 4. Discussion sessions	1. Written tests 2. Oral tests 3. Daily quizzes 4. Reports and seminars
2	2	-	Advantages and disadvantages in the stages and generations of computers.	-	-
3	2	-	Computer classification (types of computers).	-	-
4	2	-	First semester exam	-	-
5	2	-	Computer components (hardware) - input devices	-	-
6	2	-	Input devices	-	-
7	2	-	Continuation of input	-	-

			devices + output devices		
8	2	-	Computer case	-	-
9	2	-	Central processing unit (CPU)	-	-
10	2	-	Software entity	-	-
11	2	-	Number systems in computers	-	-
12	2	-	Your personal computer – computer platform	-	-
13	2	-	Factors to consider when buying your computer	-	-
14	2	-	Main features of a personal computer	-	-
15	2	-	Second semester exam	-	-
16	2	-	Spring break	-	-
17	2	-	Ethics of the digital world - forms of violations in the digital world - computer security - computer privacy	-	-
18	2	-	Software licenses - types of licenses - intellectual property - cyber breaches	-	-
19	2	-	Malware - essential steps to protect against breaches -	-	-

			health effects of computers		
20	2	-	Third semester exam	-	-
21	2	-	Definition of operating systems - functions of operating systems - objectives of operating systems - classification of operating systems	-	-
22	2	-	Windows 7 operating system	-	-
23	2	-	Folders and files	-	-
24	2	-	Icons	-	-
25	2	-	Performing operations on windows	-	-
26	2	-	Practical lab session	-	-
27	2	-	Desktop backgrounds	-	-
28	2	-	Control panel - common cases and settings	-	-
29	2	-	Practical lab session	-	-
11.					
- - Distribution of grades (out of 100) according to tasks assigned to students such as daily preparation, daily, oral, monthly, and written exams, and reports, etc. - First semester exam: 20 points Second semester exam: 20 points Annual effort: 40 points Activities and tests: daily and monthly tests and daily preparation Final exam: 60 points					
12. Learning and Teaching Resources					
Required textbooks			- Required textbooks (if applicable): Computer Fundamentals and Office		

	Applications by Prof. Ghassan Hamid Abdul Majid & Assoc. Prof. Ziad Muhammad Aboud. - Electronic references, websites: Internet References
Main references	
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	

Course description form

1. Course Name:	
Optics / Second Level	
2. Course Code:	
509080201	
3. Semester / Year:	
Annual / 2025	
4. Description Preparation Date:	
2024/10/30	
5. Available Attendance Forms: Bachelor	
In-person/ Weekly	
6. Number of Credit Hours (Total) / Number of Units (Total)	
Number of Credit Hours (90) / Number of Units (8)	
7. Course administrator's name (mention all, if more than one name)	
1 - Prof. Dr. Faten Shkor Zainulabdeen 2- Assist. Prof. Dr. Esraa Hassen Hadi	
8. Course Objectives	
Fundamentals of Optics is a science concerned with the study of the physical phenomena of light transmission and propagation through various media. It is divided over two semesters into geometric optics in the first semester, which studies physical phenomena and theories such as Newton's theory, the Huygens principle, and the wave theory and its laws, such as refraction through various types of lenses and reflection through mirrors. And Linking the theoretical side with the practical side and studying optical instruments, distortions and defects that occur in them such as aberration and its types. It is considered an experimental science as geometric optics is used in engineering applications in designing telescopes and microscopes. The second chapter enters into physical optics which includes interference, diffraction and polarization which is considered an application of all physical theories and scientific and practical applications of scientific devices.	
9. Teaching and Learning Strategies	
Strategy	1- Lecture and discussion 2- Rely on the main reference for the subject, using slides (PowerPoint). 3- Simple visual aids 4- Connect the subject to real-world situations 5- Link the theoretical material with the second-stage lab experiments 6- Develop a plan for posing questions for daily and monthly exams.

10.Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	• The student should be able to define light. • The student should be able to define wave front. • The student should be able to state Huygens principles. • The student should be able to solve problems related to the mentioned concepts.	Chapter One (The Nature and Propagation of Light), wave from and rays, Huygens principles	• Lecture method (Dialogue) • Power Point (E-learning)	• Daily and monthly quizzes. • Daily assignment • Exercises
2	3	• The student should be able to define Index of refraction. • The student should be able to understand The electromagnetic Spectrum. • The student should be able to distinguish between electromagnetic Spectrum regions. • The student should be able to calculate the Index of refraction. • The student should be able to solve problems related to the mentioned concepts.	Index of refraction, The electromagnetic Spectrum, problems.	• Lecture method (Dialogue) • Power Point (E-learning)	• Daily and monthly quizzes. • Daily assignment • Exercises
3	3	• The student should be able to define Reflection. • The student should be able to define Refraction. • The student should be able to distinguish	Chapter Two (Reflection and Refraction) Reflection and refraction at plane surface, The laws of reflection and refraction.	• Lecture method (Dialogue) • Power Point (E-learning)	• Daily and monthly quizzes. • Daily assignment • Exercises

		between Reflection and Refraction. • The student should be able to derive the laws of reflection and refraction. • The student should be able to solve problems related to the mentioned concepts.			
4	3	• The student should be able to understand the Ray treatment of reflection and refraction. • The student should be able to define the principle of Reversibility. • The student should be able to state Fermat's principle. • The student should be able to derive Fermat's law. • The student should be able to solve related problems.	Ray treatment of reflection and refraction, the principle of Reversibility, Fermat's principle, problems.	• Lecture method (Dialogue) • Power Point (E-learning)	• Daily and monthly quizzes. • Daily assignment • Exercises
5	3	• The student should be able to understand Spherical Surfaces. • The student should be able to define Focal points. • The student should be able to define Focal length. • The student should be able to calculate focal lengths. • The student should be able to derive focal lengths law.	Chapter Three (Spherical Surfaces) Focal points and focal lengths.	• Lecture method (Dialogue) • Power Point (E-learning)	• Daily and monthly quizzes. • Daily assignment • Exercises

		• The student should be able to solve related problems.			
6	3	• The student should be able to define the Conjugate points. • The student should be able to define the Conjugate planes. • The student should be able to state Convention of signs. • The student should be able to state Graphical constructions.	Conjugate points and planes, Convention of signs, Graphical constructions.	• Lecture method (Dialogue) • Power Point (E-learning)	• Daily and monthly quizzes. • Daily assignment • Exercises
7	3	• The student should be able to define parallel Ray method. • The student should be able to state Oblique-Ray methods • The student should be able to derive Magnification • The student should be able to solve related problems.	The parallel Ray method, Oblique-Ray methods, Magnification.	• Lecture method (Dialogue) • Power Point (E-learning)	• Daily and monthly quizzes. • Daily assignment • Exercises
8	3	• The student should be able to define Reduced vergeance. • The student should be able to derive Gaussian Formula. • The student should be able to use Gaussian Formula. • The student should be able to solve related problems.	Reduced vergeance, Derivation of Gaussian Formula problems.	• Lecture method (Dialogue) • Power Point (E-learning)	• Daily and monthly quizzes. • Daily assignment • Exercises
9	3	• The student should be able to define Lenses.	Chapter Four (Lenses) Thin lenses, focal points and focal lengths ,	• Lecture method (Dialogue)	• Daily and monthly quizzes.

		• The student should be able to distinguish between types of lenses. • The student should be able to use Gaussian Formula for lenses. • The student should be able to state parallel - Ray method. • The student should be able to state the different situation for image formation. • The student should be able to solve related problems.	Image formation, Conjugates points and planes, the parallel - Ray method	• Power Point (E-learning)	• Daily assignment • Exercises
10	3	• The student should be able to define oblique-Ray method. • The student should be able to distinguish between oblique- ray method and parallel ray method. • The student should be able to use the lens formula. • The student should be able to state Lateral magnification. • The student should be able to state the Virtual Images. • The student should be able to state the lens maker formula • The student should be able to solve related problems.	The oblique-Ray method, Use of the lens formula, Lateral magnification, Virtual Images and lens maker formula.	• Lecture method (Dialogue) • Power Point (E-learning)	• Daily and monthly quizzes. • Daily assignment • Exercises
11	3	• The student should be able to define Thin-lens combinations.	Thin-lens combinations, The power of a thin lens, Derivation of	• Lecture method (Dialogue)	• Daily and monthly quizzes.

		• The student should be able to state The power of a thin lens. • The student should be able to derive the lens maker formula. • The student should be able to state Thick Lines. • The student should be able to distinguish between thin and thick lenses. • The student should be able to solve related problems.	the lens Makers formula. Thick Lines, two spherical surfaces.	• Power Point (E-learning)	• Daily assignment • Exercises
12	3	• The student should be able to define Focal points. • The student should be able to define principal points. • The student should be able to state the General Thick- Lens Formula. • The student should be able to derive the General Thick- Lens Formula. • The student should be able to state Thick Lines. • The student should be able to solve related problems.	Focal points and principal points, General Thick- Lens Formula problems.	• Lecture method (Dialogue) • Power Point (E-learning)	• Daily and monthly quizzes. • Daily assignment • Exercises
13	3	• The student should be able to define Spherical Mirrors. • The student should be able to define principal point Focal points of mirrors.	Chapter Five (Spherical Mirrors) Focal points and Focal Length, Graphical constructions	• Lecture method (Dialogue) • Power Point (E-learning)	• Daily and monthly quizzes. • Daily assignment • Exercises

		• The student should be able to define principal point Focal length of mirrors. • The student should be able to state the Graphical constructions.			
14	3	• The student should be able to derive Mirror Formulas. • The student should be able to define Power of Mirrors. • The student should be able to define Thick mirror.	Mirror Formulas, Power of Mirrors, Thick mirror,	• Lecture method (Dialogue) • Power Point (E-learning)	• Daily and monthly quizzes. • Daily assignment • Exercises
15	3	• The student should be able to derive Thick – Mirror Formulas. • The student should be able to state other thick Mirrors. • The student should be able to solve related problems.	Thick – Mirror Formulas, other thick Mirrors, problems.	• Lecture method (Dialogue) • Power Point (E-learning)	• Daily and monthly quizzes. • Daily assignment • Exercises
16	3	• The student should be able to define Aberration. • The student should be able to distinguish between Aberration of Lenses and Mirrors. • The student should be able to define Spherical aberration of a lens. • The student should be able to define Spherical aberration of mirrors. • The student should be able to state the ways to correct aberrations.	Chapter Six (Aberration of Lenses and Mirrors) Aberrations, Spherical aberration of a lens, spherical aberration of mirrors.	• Lecture method (Dialogue) • Power Point (E-learning)	• Daily and monthly quizzes. • Daily assignment • Exercises

17	3	• The student should be able to define Coma. • The student should be able to distinguish between Coma and Astigmatism. • The student should be able to define curvature of field. • The student should be able to distinguish between kinds of aberration • The student should be able to state the ways to correct aberrations.	Coma, Astigmatism, curvature of field, kinds of aberration.	• Lecture method (Dialogue) • Power Point (E-learning)	• Daily and monthly quizzes. • Daily assignment • Exercises
18	3	• The student should be able to state Optical Instruments. • The student should be able to state the components of eye. • The student should be able to define Defects of vision. • The student should be able to distinguish between Defects of vision. • The student should be able to state the Spectacle. • The student should be able to state the simple microscope Magnifier. • The student should be able to state the components of the Refracting telescope.	Chapter Seven (Optical Instruments) The eye, Defects of vision, Spectacle, the simple microscope Magnifier, Refracting telescope.	• Lecture method (Dialogue) • Power Point (E-learning)	• Daily and monthly quizzes. • Daily assignment • Exercises
19	3	• The student should be able to define Normal magnification.	Normal magnification, the reflecting telescope, camera, stops,	• Lecture method (Dialogue)	• Daily and monthly quizzes.

		• The student should be able to state the reflecting telescope components. • The student should be able to state the camera components. • The student should be able to distinguish between the eye and camera. • The student should be able to state the stops. • The student should be able to state the rangefinder. • The student should be able to solve related problems.	the rangefinder, problems.	• Power Point (E-learning)	• Daily assignment • Exercises
20	3	• The student should be able to define Interference. • The student should be able to state the Huygens's principle. • The student should be able to state the young's Experiment. • The student should be able to explain how to produce the Interference Fringes from a double source.	Chapter Eight (Interference) Huygens's principle, young's Experiment, Interference Fringes from a double source.	• Lecture method (Dialogue) • Power Point (E-learning)	• Daily and monthly quizzes. • Daily assignment • Exercises
21	3	• The student should be able to define Intensity distribution in the fringe. • The student should be able to derive the equation of Intensity distribution in the fringe.	Intensity distribution in the fringe system Fesnel's Biprism, other Apparatus depending on division of the wave front, Coherent	• Lecture method (Dialogue) • Power Point (E-learning)	• Daily and monthly quizzes. • Daily assignment • Exercises

		• The student should be able to state Fesnel's Biprism. • The student should be able to explain how to produce the Interference Fringes. • The student should be able to state the other Apparatus depending on division of the wave front. • The student should be able to define Coherent sources. • The student should be able to state Division of Amplitude.	sources, Division of Amplitude.		
22	3	• The student should be able to state Michelson Interferometer. • The student should be able to define Circular Fringes. • The student should be able to state visibility of Fringes and its conditions. • The student should be able to explain interferometric measurements of length. • The student should be able to state the Twyman and Green Interferometer . • The student should be able to distinguish between Twyman and Green Interferometer .	Michelson Interferometer, Circular Fringes, visibility of Fringes, interferometric measurements of length, Twyman and Green Interferometer	• Lecture method (Dialogue) • Power Point (E-learning)	• Daily and monthly quizzes. • Daily assignment • Exercises

23	3	• The student should be able to state how to determine the index of Refraction by Interference. • The student should be able to state Reflection from a plane – parallel film. • The student should be able to state Fringes of Equal Inclination. • The student should be able to explain Newton's Rings. • The student should be able to derive Newton's Rings equation. • The student should be able to solve related problems.	Index of Refraction by Interference Methods, Reflection from a plane – parallel film, Fringes of Equal Inclination, Newton's Rings, problems.	• Lecture method (Dialogue) • Power Point (E-learning)	• Daily and monthly quizzes. • Daily assignment • Exercises
24	3	• The student should be able to define Diffraction. • The student should be able to state Diffraction conditions. • The student should be able to state Fresnel Diffraction. • The student should be able to state fraunhofer Diffraction. • The student should be able to distinguish between Fresnel and fraunhofer diffraction. • The student should be able to explain the Diffraction by a single slit.	Chapter Nine (Diffraction) Fresnel and fraunhofer diffraction, Diffraction by a single slit	• Lecture method (Dialogue) • Power Point (E-learning)	• Daily and monthly quizzes. • Daily assignment • Exercises

		• The student should be able to solve related problems.			
25	3	• The student should be able to give further Investigation of single – slit Diffraction pattern. • The student should be able to state Diffraction pattern. • The student should be able to state Rectangular Aperture. • The student should be able to state Resolving power with a Rectangular Aperture. • The student should be able to derive equation for Resolving power with a Rectangular Aperture • The student should be able to solve related problems	Further Investigation of single – slit Diffraction pattern, Rectangular Aperture, Resolving power with a Rectangular Aperture.	• Lecture method (Dialogue) • Power Point (E-learning)	• Daily and monthly quizzes. • Daily assignment • Exercises
26	3	• The student should be able to define Chromatic Resolving power of a prism. • The student should be able to derive Chromatic Resolving power equation of a prism. • The student should be able to state Circular Aperture. • The student should be able to state Resolving power of a Telescope. • The student should be able to derive equation	Chromatic Resolving power of a prism, Circular Aperture, Resolving power of a Telescope.	• Lecture method (Dialogue) • Power Point (E-learning)	• Daily and monthly quizzes. • Daily assignment • Exercises

		for state Resolving power of a Telescope. • The student should be able to solve related problems			
27	3	• The student should be able to define Resolving power of a Microscope. • The student should be able to derive equation for Resolving power of a Microscope; • The student should be able to give qualitative Aspects of the diffraction pattern. • The student should be able to derive the Equation for the Intensity. • The student should be able to solve related problems.	Resolving power of a Microscope, The double slit, qualitative Aspects of the pattern, Derivation of the Equation for the Intensity	• Lecture method (Dialogue) • Power Point (E-learning)	• Daily and monthly quizzes. • Daily assignment • Exercises
28	3	• The student should be able to make Comparison between the single slit and double-slit patterns. • The student should be able to distinction between interference and diffraction. • The student should be able to distinction between interference and diffraction problems.	Comparison of the single slit and double-slit patterns, distinction between interference and diffraction problems.	• Lecture method (Dialogue) • Power Point (E-learning)	• Daily and monthly quizzes. • Daily assignment • Exercises
29	3	• The student should be able to define Polarization. • The student should be able to explain	Chapter Ten (Polarization) Polarizations by reflection.	• Lecture method (Dialogue) • Power Point (E-learning)	• Daily and monthly quizzes. • Daily assignment

		Polarizations by reflection. • The student should be able to give the tools to produce Polarizations.			• Exercises
30	3	• The student should be able to state the representation of vibrating in light. • The student should be able to define Polarization angle. • The student should be able to state Polarization by a pile of plate	Representation of vibrating in light, Polarization angle and Brewster law. Polarization by a pile of plate.	• Lecture method (Dialogue) • Power Point (E-learning)	• Daily and monthly quizzes. • Daily assignment • Exercises

11.Course Evaluation

Activating the role of visiting lecturers, conducting group training courses for students throughout the two semesters, encouraging vocational training and field studies, and providing workshops, periodicals, software, and official websites approved by the Ministry.

12.Learning and Teaching Resources

Required textbooks	1. Fundamentals of optics, Jenkins & White, McGraw-H company, Inc., London, 2001. 2. Hecht, E., and Zajac A. (1974) optics, Addison – Wesley, Reading MA. London 1974.
Main references	Hecht, E., and Zajac A. (1974) optics, Addison – Wesley, Reading MA. London 1974.
Recommended books and references (scientific journals, reports...)	1. Schaum's outline series: Theory and Problems by optics by E. Hecht 1975 McGraw-Hill company Inc., New York. 2. F.W. Sears, optics. Addison – welley publishing company, Inc., London 1970.
Electronic References, Websites	

Course Description Form

1. Course Name:	
Advanced Electricity and Magnetism	
2. Course Code:	
509080202	
3. Semester / Year:	
Annual/2024	
4. Description Preparation Date:	
30/10/2024	
5. Available Attendance Forms: Bachelor	
In-person/Weekly	
6. Number of Credit Hours (Total) / Number of Units (Total)	
6. Number of Credit Hours(60) / Number of Units (180)	
7. Course administrator's name (mention all, if more than one name)	
1 – Dr.Zain Al-Abideen Majid Mohammad 2– Dr.Hassan Hadi Darwoysh	
8. Course Objectives	
To familiarize the student with the basic ideas, foundations and theoretical concepts of advanced electricity and magnetism by developing skills in solving mathematical problems, deriving basic laws and relating them to our daily lives, which are replete with electrical devices that operate according to the laws under study. Most of the laws and concepts in the subject are verified by the student through practical experiments in the laboratory, which provides the student with additional skills represented in dealing with various measuring devices, knowing how to operate them and employing them to verify theoretical laws.	
9. Teaching and Learning Strategies	
Strategy	1– Encourage students to actively participate in class by asking questions that motivate students to engage in opinion-sharing and

	group discussion. 2– Show educational videos to clarify a concept and provide students with the opportunity to discuss them 3– Conduct virtual experiments (simulations) using advanced software.
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10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2		Chapter One: <u>Magnetic Field</u> 1– Historical Overview. 2– Magnetic Field.	Using the whiteboard and data show.	☐ Direct questions for students. ☐ Quick test. ☐ Homework. ☐ Exam at the end of each chapter.
2	2		3– Magnetic Flux. 4– Direction of Magnetic Field.	Using the whiteboard and data show.	☐ Direct questions for students. ☐ Quick test. ☐ Homework. ☐ Exam at the end of each chapter.
3	2		5– Force on a Moving Electric Charge in a Magnetic Field. 6– Motion of a Charged Body in a Magnetic Field.	Using the whiteboard and data show.	☐ Direct questions for students. ☐ Quick test. ☐ Homework. ☐ Exam at the end of each chapter.

4	2		7– Motion of a Charged Body in Perpendicular Electric and Magnetic Fields. 10– Hall Effect. 11– Exercises.	Using the whiteboard and data show.	☐ Direct questions for students. ☐ Quick test. ☐ Homework. ☐ Exam at the end of each chapter.
5	2		Chapter Two: <u>Some Electrical Measuring Devices</u> 1– Force on a Conductor Carrying Electric Current in a Magnetic Field. 2– Torque on a Coil Carrying Electric Current in a Magnetic Field.	Using the whiteboard and data show.	☐ Direct questions for students. ☐ Quick test. ☐ Homework. ☐ Exam at the end of each chapter.
6	2		3– Moving Coil Galvanometer. 4– Ammeter.	Using the whiteboard and data show.	☐ Direct questions for students. ☐ Quick test. ☐ Homework. ☐ Exam at the end of each chapter.
7	2		6–Voltmeter. 7–Ballistic. Galvanometer 8–Exercises.	Using the whiteboard and data show.	☐ Direct questions for students. ☐ Quick test. ☐ Homework. ☐ Exam at the end of each chapter.

8	2		Chapter Three: <u>Magnetic Field of Electric Current</u> 1– Biot–Savart Law and its Applications. 2– Magnetic Induction of a Straight Wire.	Using the whiteboard and data show.	☐ Direct questions for students. ☐ Quick test. ☐ Homework. ☐ Exam at the end of each chapter.
9	2		3– Finding Magnetic Flux Density at a Point on the Axis of a Circular Wire. 4– Finding Magnetic Flux Density at a Point on the Axis of a Solenoid.	Using the whiteboard and data show.	☐ Direct questions for students. ☐ Quick test. ☐ Homework. ☐ Exam at the end of each chapter.
10	2		5– Magnetic Induction of a Moving Electric Charge. 6– Force Between Two Long Straight Wires Carrying Electric Current.	Using the whiteboard and data show.	☐ Direct questions for students. ☐ Quick test. ☐ Homework. ☐ Exam at the end of each chapter.
11	2		7– Definition of Ampere. 8– Ampere's Circuital Law .	Using the whiteboard and data show.	☐ Direct questions for students. ☐ Quick test. ☐ Homework. ☐ Exam at the end of each chapter.
12	2		9– Finding Magnetic Flux Density of a Very Long Straight Wire	Using the whiteboard and data show.	☐ Direct questions for students.

			Using Ampere's Law. 10– Determining Magnetic Flux Density Inside a Very Long Solenoid.	show.	☐ Quick test. ☐ Homework. ☐ Exam at the end of each chapter.
13	2		11–Determining Magnetic Flux Density Inside a Toroid. 12– Exercises.	Using the whiteboard and data show.	☐ Direct questions for students. ☐ Quick test. ☐ Homework. ☐ Exam at the end of each chapter.
14	2		Chapter Four: <u>Induced Electromotive Force</u> 1– Motional Induced Electromotive Force. 2– Faraday's Law.	Using the whiteboard and data show.	☐ Direct questions for students. ☐ Quick test. ☐ Homework. ☐ Exam at the end of each chapter.
15	2		3– Lenz's Law. 4– Measuring Magnetic Flux Density Using an Induction Coil.	Using the whiteboard and data show.	☐ Direct questions for students. ☐ Quick test. ☐ Homework. ☐ Exam at the end of each chapter.
16	2		5– Faraday's Disk. 6– Electric Generator.	Using the whiteboard and data show.	☐ Direct questions for students. ☐ Quick test. ☐ Homework. ☐ Exam at the end of each chapter.

17	2		7– Induced Electric Field. 8– Exercises.	Using the whiteboard and data show.	☐ Direct questions for students. ☐ Quick test. ☐ Homework. ☐ Exam at the end of each chapter.
18	2		Chapter Five: <u>Inductance</u> 1– Mutual Inductance. 2– Self–Inductance.	Using the whiteboard and data show.	☐ Direct questions for students. ☐ Quick test. ☐ Homework. ☐ Exam at the end of each chapter.
19	2		3– Energy Stored in a Magnetic Field. 4– Magnetic Energy Density.	Using the whiteboard and data show.	☐ Direct questions for students. ☐ Quick test. ☐ Homework. ☐ Exam at the end of each chapter.
20	2		5– Connecting Inductors Together. 6– Electrical Transformer.	Using the whiteboard and data show.	☐ Direct questions for students. ☐ Quick test. ☐ Homework. ☐ Exam at the end of each chapter.
21	2		7– Eddy Currents 8– Exercises	Using the whiteboard and data show.	☐ Direct questions for students. ☐ Quick test. ☐ Homework. ☐ Exam at the

					end of each chapter.
22	2		Chapter Six: <u>Alternating Current</u> 1– Instantaneous Current. 2– Impedance Elements (R.L.C).	Using the whiteboard and data show.	▢ Direct questions for students. ▢ Quick test. ▢ Homework. ▢ Exam at the end of each chapter.
23	2		3– Vector Diagram for Resistance R – Inductive Reactance XL – Capacitive Reactance XC and Impedance. 4– Instantaneous Value of Power.	Using the whiteboard and data show.	▢ Direct questions for students. ▢ Quick test. ▢ Homework. ▢ Exam at the end of each chapter.
24	2		5– RMS Value of Alternating Current and Alternating Voltage. 6– Vector Diagram for Voltage.	Using the whiteboard and data show.	▢ Direct questions for students. ▢ Quick test. ▢ Homework. ▢ Exam at the end of each chapter.
25	2		7– Power in AC Circuits. 8– Parallel Connection (Simple Circuits).	Using the whiteboard and data show.	▢ Direct questions for students. ▢ Quick test. ▢ Homework. ▢ Exam at the end of each chapter.
26	2		9– Resonance 10– Skin Effect 11– Exercises.	Using the whiteboard and data	▢ Direct questions for students. ▢ Quick test.

				show.	☐ Homework. ☐ Exam at the end of each chapter.
27	2		Chapter Seven: <u>Magnetic Properties of Materials</u> 1– Origin of Magnetic Phenomena. 2– Equivalent Surface Currents.	Using the whiteboard and data show.	☐ Direct questions for students. ☐ Quick test. ☐ Homework. ☐ Exam at the end of each chapter.
28	2		3– Magnetic Susceptibility (χ) and Permeability and Magnetic Field Intensity H . 4– Magnetization or Intensity of Magnetization.	Using the whiteboard and data show.	☐ Direct questions for students. ☐ Quick test. ☐ Homework. ☐ Exam at the end of each chapter.
29	2		5– Magnetic Poles. 6– Earth's Magnetic Field. 7– Comprehensive Definition of Magnetic Field Intensity.	Using the whiteboard and data show.	☐ Direct questions for students. ☐ Quick test. ☐ Homework. ☐ Exam at the end of each chapter.
30	2		8– Magnetization of a Rod. 9–Torsional Torque on a Magnetic Rod. 10– Magnetic Moment. 11– Exercises.	Using the whiteboard and data show.	☐ Direct questions for students. ☐ Quick test. ☐ Homework. ☐ Exam at the end of each chapter.

11. Course Evaluation	
1– Solving mathematical problems. 2– Writing a theoretical report. 3– Discussing a theoretical section and linking it to the practical aspect. 4– Written exams.	
12. Learning and Teaching Resources	
Required textbooks	Electricity and Magnetism Authored by: Dr.Ibrahim Nasser Dr. Abdul Sattar Jawad Dr. Anwar Jamil Salim
Main references	1– Physics for Scientists and Engineers, by Serway. 2– Fundamentals of Physics, by Holliday. 3 – Concepts in Physics, by Varma.
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	Educational Physics Forum website https://hazemsakeek.org/vb

Astronomy Physics - Second Stage (Morning and Evening Studies)

1. Course Name:					
Astronomy Physics					
2. Course Code:					
509080203					
3. Semester / Year:					
Annual/2023-2024					
4. Description Preparation Date:					
30/10/2024					
5. Available Attendance Forms: Bachelor					
Weekly					
6. Number of Credit Hours (Total) / Number of Units (Total):					
60 Hours / 120 Units					
7. Course administrator's name (mention all, if more than one name):					
1- Assoc. Prof. Dr. Faez M. Hassan					
2- Assoc. Prof. Rushdi Ibrahim Jassim					
8. Course Objectives					
It is one of the study courses for second-year students in the physics departments of colleges of education, with two theoretical hours per week. This course is considered one of the branches of applied physics and aims to introduce the student to the basics of astronomy by applying the laws of physics to study planets, the sun, solar systems, elements, and other phenomena of outer space.					
9. Teaching and Learning Strategies					
Strategy		1. Following external sources. 2. Preparing external questions from those sources 3. Following the style of classroom discussions. 4. Encourage students to follow educational programs that are presented in video format on official scientific links. 5. Asking questions about topics that can be discussed by students in class 6. Asking questions for students to solve in the classroom. 7. Conduct daily quick exams with thought-provoking questions. 8. Conducting short report sessions involving two or more students to study a topic related to the curriculum.			
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Cognitive objectives 1. Understanding basic concepts for astronomy in general and astrophysics in particular. 2. The application of astrophysical laws. 3. Linking the theoretical aspect of the subject with the practical applications of astronomical observations. 4. Understanding the use of astronomical terms. 5. Explanation of the types of systems used in astronomical observation. 6. Explanation of Kepler's laws, first, second, and third. 7. Linking the concept of astrophysics with astronomical phenomena in our lives. 8. Enabling the student to scientifically interpret astronomical events and phenomena. Cognitive objectives The student should know	Chapter One: 1. The celestial sphere and its apparent motion. The celestial sphere and its apparent motion. 2. Parts of the celestial sphere. Parts of the celestial sphere. Coordinate systems in the celestial sphere, the horizontal system, the angular height of the celestial body, the horizontal direction, the azimuth, the equatorial system, the declination, the hour angle, the right ascension, the precession system, the galactic system.	1. Discussion 2. The main reference for the material is based on slides (PPT) and the use of a smart board. 3. Simple visual aids. 4. Connecting the material to reality. 5. Setting a plan for asking questions for daily and monthly exams.	1-Daily, oral, and written exams (on the board and paper). 2- Solving problems from each chapter on the board. 3- Preparing reports related to some chapters of the subject. 4- The periodic monthly exams.

		astronomical observation methods and astrophysical theories, which include the description of the origin of the universe, dark matter, black holes, the existence of multiple universes, and more.			
2	2		Chapter One: 1. The relationship between horizontal coordinates and equatorial coordinates. The relationship between horizontal coordinates and equatorial coordinates. 2. The precession (rotation of the Earth), astronomical units of measurement, the astronomical unit, the light-year, the parsec, the parallax (stellar parallax). Precession (Earth's rotation), astronomical units of measurement, astronomical unit, light-year, parsec, parallax (apparent shift). Mathematical problems and various questions.		
3	2		Chapter Two: The Planets The planets: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune, and Pluto. Bode's Law. Small asteroids, meteors, meteorites, comets.		
4	2		Chapter Two: The Planets 1. The origin of the solar system. Hypothesis of the formation of the solar system, Descartes' hypothesis, Buffon's hypothesis, Chamberlin and Moulton's hypothesis, Jeans and Jeffreys' hypothesis, the nebular hypothesis. 2. Phases of the Moon - Eclipses - Solar Eclipse. Phases of the Moon - Lunar and Solar Eclipses - Solar Eclipse. Mathematical problems and various questions.		
5	2		The first monthly exam		
6	2		Chapter Three: Kepler's Laws Kepler's Laws - Mathematical Tasks		
7	2		Chapter Three: Kepler's Laws Kepler's Laws - Additional Mathematical Tasks.		
8	2		Chapter Four: The Sun and the Moon 1. The sun: the physical properties of the sun 2. Methods for measuring the surface temperature of the sun: Stefan-Boltzmann Law – Planck's Law – Wien's Law.		
9	2		Chapter Four: The Sun and the Moon 1. The layers of the sun's atmosphere, the sun's surface phenomena: sunspots, solar flares, and solar winds. 2. Methods for measuring the diameter and mass of the Sun.		
10	2		Chapter Four: The Sun and the Moon 1. The Moon: Physical properties of the Moon, measuring the physical properties of the Moon: mass of the Moon / density of the Moon / surface gravity of the Moon. Gravity of the Moon. 2. The astronomical seasons. 3. Mathematical problems Mathematical problems.		

11	2		The second monthly exam		
12	2		Chapter Five: Theories of the Universe's Origin: Aristotle's Universe - Olbers' Paradox - Einstein's Universe - The Big Bang Theory. The steady state theory. The future of the universe and life in the universe. Quasars (quasi-stellar objects). Mathematical problems.		
13	2		Chapter Six: Galaxies Variable stars, the galaxy (Milky Way), galaxy movement. Types of galaxies: spiral galaxies, elliptical galaxies, irregular galaxies. Active galaxies, Seyfert galaxies, radio galaxies.		
14	2		Chapter Six: Galaxies The motion of celestial bodies in the galaxy, star clusters, and measuring the distance of star clusters. Nebulae and the interstellar medium: emission nebulae - reflection nebulae - dark nebulae.		
15	2		Chapter Six: Galaxies Questions and mathematical exercises. Multi choice questions.		
16	2		Chapter Seven: Stellar Physics 1 The star, the apparent magnitudes of stars, and the calculation of their values. Update: Additional examples. Absolute magnitudes of stars and finding their values, luminosity of stars and calculating it.		
17	2		Chapter Seven: Stellar Physics 1 The relationship of the luminosity of stars to their intrinsic brightness, the inverse square law. The colors of stars and their temperatures – the age of the star. Questions and problems - Multiple- choice questions.		
18	2		Chapter Seven: Stellar Physics 1 Questions and mathematical exercises. Multi choice questions.		
19	2		The third monthly exam		
20	2		Chapter Eight: Stellar Physics 2 The spectral types of stars. Stellar distance, methods of determining stellar distance, the relationship between stars and their mass and luminosity, the Hertzsprung-Russell diagram, and the positioning of stars on the H-R diagram. (H-R).		
21	2		Chapter Eight: Stellar Physics 2 Main sequence group, giant star group, white dwarf star group, neutron stars, black holes, comets, meteors, and meteoroids. Questions and problems - Multiple choice questions.		
22	2		Chapter Eight: Stellar Physics 2 Questions and mathematical exercises. Multi choice questions.		
23	2		Chapter Nine: Binary Stars Binary stars, types of binary stars,		

			apparent binaries, optical binaries, spectroscopic binaries, astrometric binaries, eclipsing or photometric binaries. Update: Additional examples.		
24	2		Chapter Nine: Binary Stars Angular motion, radial velocity, tangential velocity, spatial velocity of stars. Factors affecting stellar velocity measurements, measuring star diameters, update: additional examples.		
25	2		Chapter Nine: Binary Stars Questions and mathematical exercises. Multi choice questions.		
26	2		Chapter Ten: Telescopes Telescopes, reflecting telescopes, the working principle of the reflecting telescope, the advantages of reflecting telescopes, the disadvantages of reflecting telescopes. Update: Radio telescopes (Updated material in the curriculum).		
27	2		Chapter Ten: Telescopes Update: Refracting telescopes, the working principle of the refracting telescope (updated material in the syllabus). Advantages of refracting telescopes, disadvantages of refracting telescopes (updated material in the syllabus).		
28	2		The fourth monthly exam		
29	2		Comprehensive review of the full topic (course).		
30	2		Comprehensive review of the full topic (course).		

11. Course Evaluation

Periodic review of the curriculum to identify strengths and weaknesses, make adjustments based on feedback, involve students, and conduct a comprehensive evaluation of the curriculum according to the latest developments in astronomy and keep up with new advancements and discoveries through.

- 1- Following up on curricula in global universities, new terminologies, and the teaching methods used.
- 2- Following up on videos and explanatory diagrams.
- 3- Participating in the course-specific workshops.

12. Learning and Teaching Resources

Required textbooks	
Main references	1. Fundamental Astronomy 5th Ed, H. Karttunen, etal; Springer – 2006. 2. Astronomy - Principles and Practice 4th Ed, A. Roy, D Clarke; Springer -2000. 3. Karttunen, H., Kröger, P., Oja, H., Poutanen, M., Donner, K.J., 2017. Fundamental Astronomy, Springer (New Reference).
Recommended books and references (scientific journals, reports...)	1. Perryman, M., 2018. The exoplanet handbook, Cambridge University Press.
Electronic References, Websites	There are many astronomy websites where students can browse everything related to astronomy in Arabic and English as they see fit, download e-books or research in this field, or follow some educational websites and platforms like YouTube.

Course description form

1. Course name and stage:
Mathematics/ second stage
2. Course code:
509080204
3. Semester/Year: Annual
Annual
4. Date this description was prepared:
2024/10/30
5. Available forms of attendance:
In-person/Weekly
6. Number of study hours (total) / Number of units (total):
Credit Hours 90 Hours / Number of Units 180
7. Course administrator's name (if more than one name)
Dr. Zainab Abdul-Salam , Dr.Muhsin Attia , Dr.Saba Jameel
8. Course Objectives
1. Studying certain properties of infinite sequences and series, along with the mathematical operations applied to them. 2. Studying various types of partial, total, and complete derivatives, as well as the chain rule for functions of two or more variables and related equations. 3. Studying the properties of vectors in three-dimensional space with different coordinate systems, and explaining some of their applications. 4. Studying methods for solving first-order and second-order differential equations, including techniques for converting second-order equations into first-order ones.
9. English translation. Teaching and Learning Strategies

1-Using simple visual aids 2-Relating the material to real-life situations 3-Discussion- based learning 4-connecting theoretical material with second-year lab subjects and experiments 5-Developing a structured plan for daily and monthly exam questions.

10. Course Structure					
week	Hours	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method
1	3	The student can distinguish between types of sequences.	Finite and infinite sequence	- Smart board discussion in real life - Connecting the material to real life - Developing a plan for asking questions and conducting daily quick tests	- Daily oral and written exams (on the board and on paper). - Solving each chapter's questions on

					the board. - Periodic monthly exams.
2	3	The student should know the formation of series and distinguish between the types of series.	Convergence of series (methods test), examples, home work	- Smart board discussion. - Connecting the material to reality. - Developing a plan for asking questions, setting questions, and conducting daily quick tests.	- Daily oral and written exams (on the board and on paper). - Solving problems for each chapter on the board. - Periodic monthly exams.
3	3	The student will be able to distinguish the type of alternating series and determine the interval of convergence.	Alternating series and conditional convergence	- Smart board. - Discussion. - Connecting the material to reality. - Developing a plan for asking questions, setting questions, and conducting daily quick tests.	- Daily oral and written exams (on the board and on paper). - Solving problems for each chapter on the board. - Periodic monthly exams.

4	3	The student should be able to identify the types of power series, their convergence and divergence.	Convergence of power series	-Smart board. -Discussion. -Connecting the material to reality. -Simple visual aids. -Developing a plan for asking questions, setting questions, and conducting daily quick tests.	- Daily oral and written exams (on the board and on paper). - Solve each chapter's problems on the board. - Periodic monthly exams.
5	3	The student should be able to convert the function into a series of one of these types.	Maclaurin series	- Smart board - Discussion - Connecting the material to reality - Developing a plan for asking questions, setting questions, and conducting daily quick quizzes	- Exams - Daily, oral, and written (on the board and on paper). - Solve each chapter's problems on the board. - Periodic monthly exams.
6	3	The student should be able to find the differential and integral equations of various types of series.	Differentiation & integral of power series	- Smart board. - Discussion. -Connecting the material to reality. - Developing a plan for asking questions, setting questions, and conducting daily quick quizzes.	- Exams - Daily, oral, and written (on the board and on paper). - Solve each chapter

					's problems on the board. - Periodic monthly exams.
7	3	- The student should be able to find the product of two series of multiplication or division.	Multiplication & division of power series	- Smart board. - Discussion. - Connecting the material to reality. - Developing a plan for posing questions, setting questions, and conducting daily quick quizzes.	- Exams - Daily, oral, and written (on the board and on paper). - Solve each chapter's problems on the board. - Periodic monthly exams
8	3	Knowing how to write a vector in spatial coordinates	Vectors in space, algebraic addition	.Smart board - .Discussion - Connecting the - .material to reality - Developing a plan for posing questions, setting questions, and conducting daily quick quizzes.	- Exams Daily, - oral, and written (on the board and on .(paper Solve - each chapter's problems on the .board - Periodic monthly exams

9	3	Finding the addition and subtraction of two or more vectors	Examples	.Smart board - .Discussion - Connecting the - .material to reality - Developing a plan for posing questions, setting questions, and conducting daily quick quizzes.	- Exams Daily, - oral, and written (on the board and on .(paper Solve - each chapter 's problems on the .board - Periodic monthly exams
10	3	Finding the value of the scalar product of two vectors and the physical quantities corresponding to this type of product	The dot product	.Smart board - .Discussion - Connecting the - .material to reality - Developing a plan for posing questions, setting questions, and conducting daily quick quizzes.	- Exams Daily, - oral, and written (on the board and on .(paper Solve - each chapter 's problems on the .board - Periodic monthly exams
11	3	Finding the product of two vectors and the physical quantities corresponding to this type of product	Examples	.Smart board - .Discussion - Connecting the - .material to reality - Developing a plan for posing questions, setting questions, and conducting daily quick quizzes.	- Exams Daily, - oral, and written (on the board and on .(paper Solve - each

					chapter's problems on the .board - Periodic monthly exams
12	3	How to find the product of vectors in their three-dimensional and scalar forms	Examples	.Smart board - .Discussion - Connecting the - .material to reality - Developing a plan for posing questions, setting questions, and conducting daily quick quizzes.	- Exams Daily, - oral, and written (on the board and on .(paper Solve - each chapter's problems on the .board - Periodic monthly exams
13	3	How to solve examples	Examples	.Smart board - .Discussion - Connecting the - .material to reality - Developing a plan for posing questions, setting questions, and conducting daily quick quizzes.	- Exams Daily, - oral, and written (on the board and on .(paper Solve - each chapter's problems on the .board - Periodic monthly exams

14	3	How to solve examples	Examples	.Smart board - .Discussion - Connecting the - .material to reality - Developing a plan for posing questions, setting questions, and conducting daily quick quizzes.	- Exams Daily, - oral, and written (on the board and on .(paper Solve - each chapter 's proble ms on the .board - Periodi c monthl y exams
15	3	How to write the equation of a straight line	From a point to a line, examples, homework	.Smart board - .Discussion - Connecting the - .material to reality - Developing a plan for posing questions, setting questions, and conducting daily quick quizzes.	- Exams Daily, - oral, and written (on the board and on .(paper Solve - each chapter 's proble ms on the .board - Periodi c monthl y exams
16	3	Learn about the different types of coordinate systems and how to represent a vector in each system.	Coordinate system, cylindrical	.Smart board - .Discussion - Connecting the - .material to reality - Developing a plan for posing questions, setting questions, and conducting daily quick quizzes.	- Exams Daily, - oral, and written (on the board and on .(paper Solve - each

					chapter's problems on the .board - Periodic monthly exams
17	3	How to find the vector representation for each of these types of coordinates	Coordinate systems, Cartesian, cylindrical and spherical	.Smart board - .Discussion - Connecting the - .material to reality - Developing a plan for posing questions, setting questions, and conducting daily quick quizzes.	- Exams Daily, - oral, and written (on the board and on .(paper Solve - each chapter's problems on the .board - Periodic monthly exams
18	3	Knowing this type of functions	Functions of two independent variables	.Smart board - .Discussion - Connecting the - .material to reality - Developing a plan for posing questions, setting questions, and conducting daily quick quizzes.	- Exams Daily, - oral, and written (on the board and on .(paper Solve - each chapter's problems on the .board - Periodic monthly exams

19	3	Knowing this type of functions	Function of two or more variables	.Smart board - .Discussion - Connecting the - .material to reality - Developing a plan for posing questions, setting questions, and conducting daily quick quizzes.	- Exams Daily, - oral, and written (on the board and on .(paper Solve - each chapter 's problems on the .board - Periodic monthly exams
20	3	How to find the gradient of a given function	Gradients derivatives	.Smart board - .Discussion - Connecting the - .material to reality - Developing a plan for posing questions, setting questions, and conducting daily quick quizzes.	- Exams Daily, - oral, and written (on the board and on .(paper Solve - each chapter 's problems on the .board - Periodic monthly exams
21	3	How to solve examples	Examples	.Smart board - .Discussion - Connecting the - .material to reality - Developing a plan for posing questions, setting questions, and conducting daily quick quizzes.	- Exams Daily, - oral, and written (on the board and on .(paper Solve - each

					chapter's problems on the .board - Periodic monthly exams
22	3	Knowing and finding this type of differentiation	The total differential examples	.Smart board - .Discussion - Connecting the - .material to reality - Developing a plan for posing questions, setting questions, and conducting daily quick quizzes.	- Exams Daily, - oral, and written (on the board and on .(paper Solve - each chapter's problems on the .board - Periodic monthly exams
23	3	How to solve examples	Examples	.Smart board - .Discussion - Connecting the - .material to reality - Developing a plan for posing questions, setting questions, and conducting daily quick quizzes.	- Exams Daily, - oral, and written (on the board and on .(paper Solve - each chapter's problems on the .board - Periodic monthly exams

24	3	Being able to solve equations this way	Separable (variable) equations ,homogenous equations	.Smart board - .Discussion - Connecting the - .material to reality - Developing a plan for posing questions, setting questions, and conducting daily quick quizzes.	- Exams Daily, - oral, and written (on the board and on .(paper Solve - each chapter 's problems on the .board - Periodic monthly exams
25	3	Being able to solve equations this way	Introduction of differential equations, first order differential equations	.Smart board - .Discussion - Connecting the - .material to reality - Developing a plan for posing questions, setting questions, and conducting daily quick quizzes.	- Exams Daily, - oral, and written (on the board and on .(paper Solve - each chapter 's problems on the .board - Periodic monthly exams
26	3	Distinguish the type of equation and then be able to solve it	Solving first-order differential equations	.Smart board - .Discussion - Connecting the - .material to reality - Developing a plan for posing questions, setting questions, and conducting daily quick quizzes.	- Exams Daily, - oral, and written (on the board and on .(paper Solve - each

					chapter's problems on the .board - Periodic monthly exams
27	3	How to solve examples	Examples	.Smart board - .Discussion - Connecting the - .material to reality - Developing a plan for posing questions, setting questions, and conducting daily quick quizzes.	- Exams Daily, - oral, and written (on the board and on .(paper Solve - each chapter's problems on the .board - Periodic monthly exams
28	3	How to solve examples	Examples	.Smart board - .Discussion - Connecting the - .material to reality - Developing a plan for posing questions, setting questions, and conducting daily quick quizzes.	- Exams Daily, - oral, and written (on the board and on .(paper Solve - each chapter's problems on the .board - Periodic monthly exams

29	3	How to differentiate and solve equations of this type	Linear second order homogenous equations with constant coefficients	.Smart board - .Discussion - Connecting the - .material to reality - Developing a plan for posing questions, setting questions, and conducting daily quick quizzes.	- Exams Daily, - oral, and written (on the board and on .(paper Solve - each chapter 's problems on the .board - Periodic monthly exams
30	3	How to differentiate and solve equations of this type	Linear second order non homogenous equations with constant coefficients	.Smart board - .Discussion - Connecting the - .material to reality - Developing a plan for posing questions, setting questions, and conducting daily quick quizzes.	- Exams Daily, - oral, and written (on the board and on .(paper Solve - each chapter 's problems on the .board - Periodic monthly exams

11. Course Evaluation

1. Conducting daily oral and written quizzes, in addition to monthly exams at the end of each semester to assess students' understanding of the material.
2. Encouraging students to ask discussion-based questions while solving exercises to enhance interaction and collaborative thinking.
3. Preparing joint reports by two or more students on the physical applications of the topics taught in class, to promote research and teamwork.

12. Learning and Teaching Resources

Required textbooks (methodology, if any)

Main references (sources)	(textbooks) Calculus and Analytic geometry by George by Thomas 7th edition 1988 المعادلات التفاضلية الجزئية للكليات العلمية والهندسية تأليف اس جي فارلو، ترجمة د. عطا الله ثامر العاني - جامعة بغداد - بيت الحكمة
Recommended books and references (scientific journals, reports...)	:(Suggested references (Thomas Calculus) George B. Thomas Jr. 11th Edition 2008. Metric International Version Calculus, James Stewart, 6th Edition 2008. Mathematical methods for physics 2013/ George Arfken, Hans J. Webi, Frank E. Har
Electronic References, Websites	Lectures in the academic profile.

Sound and wave motion - First Level (Morning and Evening)

1. Course Name:	
Sound and wave motion	
2. Course Code:	
509 08 02 05	
3. Semester / Year:	
Annual / 2024–2025	
4. Description Preparation Date:	
16/9/2024	
5. Available Attendance Forms:	
Weekly personal attendance	
6. Number of Credit Hours (Total) / Number of Units (Total)	
60 hours / 120 credit hours	
7. Course administrator's name (mention all, if more than one name)	
Name: 1- Prof. Dr. Ghada Sabah Karam, 2- Prof. Dr. Majid Hameed Hassouni	
8. Course Objectives	
Course Objectives	Subject Objectives: Cognitive Objectives of the Subject - Enable students to recognize the nature of sound, its continuity, flexibility, inertia - Enable students to recognize the physical mechanism of sound Student Skill Objectives: - Enable students to acquire research skills - Train students to use modern teaching methods - Train students to prepare research and reports related to the physical material of sound and wave events with natural phenomena Student Emotional Objectives - Teaching students to know pride in science and scientists - Developing students' sense of responsibility - Teaching students honesty and objectivity in presenting facts - Teaching students to manage time and responsibility

	lectures
9. Teaching and Learning Strategies	
Strategy	Preparing teaching methods based on understanding the scientific material related to sound and wave motion Through academic achievement and using evaluation exams to know the extent of the student's comprehension of the material and understanding the philosophy of physics in the field of sound and identifying the characteristics wave motion and providing research reports to comprehend the material and identify the latest scientific findings in this field Using new methods in education and teaching, cognitive and non-cognitive Using modern models in education and assigning students some extracurricular activities Spreading the spirit of cooperation among students and learning time management and students discussing with each other the scientific material from reports and research related to the subject of sound and wave motion

10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
First	2 hours	Chapter One: Sound its origin and transmission The student can know: Sound, continuity, elasticity, inertia. The student can explain the physical meaning of sound.	Sound, its origin and transmission Phonetics, sound has two meanings: The psychological meaning, 2. The physical meaning, 1. The origin of sound, the occurrence and spread of sound	Lecture Using Computer And Data Show Presentation and Discussion Daily Preparation	Daily exams Oral and written (On the board and paper) Solving problems of each chapter On board
Second	2 hours	The student can explain the psychological meaning of sound. The student can show the origin of sound. The student can show the occurrence of sound. The student can mention the basic condition for the occurrence and propagation of sound.	conditions are required: 1. Its source, 2. A material medium, 3. The medium must have flexibility and inertia, sound needs a medium for its transmission: The medium must have 1. Flexibility, 2. Continuity. Free vibration, simple harmonic motion, force	Asking Questions Students and Encouraging Daily Participation ==== Paper Exam Method of Asking Questions and Discussion Presentation and Discussion	Preparing report on Some chapters of the subject Monthly exams Periodic Ask questions giving grades daily Scientific discussion Daily preparation

Third	2 hours	The student can mention the basic conditions that must be available in the medium transmitting sound.	generated by elasticity, definition of complete oscillation, duration of oscillation, frequency, displacement, amplitude, simple harmonic motion equations, projection of circular motion on the diameter of the circle, phase, phase difference, energy of a simple harmonic oscillator, differential equation of simple harmonic motion, applications of simple harmonic motion, helical spring, simple pendulum, floating body, liquid in a U-shaped tube, mass connected between two springs, compound pendulum, lithographic pendulum.	Asking Questions and Answers Explanation Discussion	and giving grades Daily preparatory exam Preparing report Homework examination
Fourth	2 hours	Chapter Two: Theory of Vibration The student can know: Vibrational motion, simple harmonic motion, force return, oscillation, frequency, displacement, amplitude, phase.			
Fifth	2 hours	The student can solve problems about equations of simple harmonic motion. The student can explain the energy of a simple harmonic oscillator.			
Sixth	2 hours	The student can write the differential equation for simple harmonic motion. The student can conduct applications on simple harmonic motion.			
Seventh	2 hours	The student can compare between a simple pendulum and a helical spring. The student can give examples of simple harmonic motion, compound pendulum and lithographic pendulum.			
Eighth	2 hours	The student can design an experiment on a liquid in a U-tube.			

Ninth	2 hours	Chapter Three: Composition Simple Harmonic Motions	frequency ratio as to 1 graphically, beats. Decayed vibration Forces causing dec		
Ten	2 hours	The student can explain the rule of composition.	of vibrations, equation of decaye harmonic motion, decayed harmonic motion states: First		
Eleventh	2 hours	The student can dr Sigas diagrams.	case: state of no decay, Second case state of incomplete		
Twelfth	2 hours	The student can dr a graph of the composition of two simple harmonic motions	decay motion, Third case: state of critica motion, Fourth cas state of excess deca motion. Forced		
Thirteenth	2 hours	perpendicular to ea other with the sam frequency.	vibration, Forced oscillations (forced), Forced oscillations		
Fourteen	2 hours	The student can dr a graph of the composition of two simple harmonic motions	equation, resonanc amplitude of vibration at resonance, practica		
Fourteen	2 hours	perpendicular to ea other with the ratio of their frequencies as 2 to 1.	examples of resonance. Wave motion Classification of mechanical waves into: 1. Transverse waves:		
Fifteenth	2 hours	Chapter Four: Damped Vibration The student can define damped vibration	2. Longitudinal wav properties of wave motion, transverse wave velocity in a stretched string, mathematical representation of t		
Fifteenth	2 hours	The student can explain the forces causing the oscillations to deca The student can mention the equati of damped harmonic	wave, phase and phase difference, differential equatio of a simple harmon wave, standing waves, theory of vibration of a stretched string of finite length. Longitudinal wave		

		motion.	in gases (sound waves in gases)		
Sixteenth	2 hours	The student can mention the cases of a longitudinal wave damaged harmonic longitudinal wave motion.	Adiabatic behavior of a longitudinal wave, longitudinal wave velocity in a gas, Laplace correction, effect of temperature on the speed of sound, effect of pressure on the speed of sound, effect of humidity on the speed of sound, pressure changes in sound wave, density of sound wave energy, sound wave intensity, sound wave interference, interference Two waves of equal amplitude and frequency that travel in the same direction, interference of two waves of equal frequency but different in initial phase and amplitude that travel in the same direction.		
Seventeenth	2 hours	The student can compare the four cases of damaged harmonic motion. Chapter Five: Force and Vibration			
Eighteenth	2 hours	The student can identify forced vibration, forced oscillations, resonance, amplitude of vibration at resonance.			
Nineteenth	2 hours	The student can mention the equation of forced oscillation. The student can give practical examples of resonance.			
Twentieth	2 hours	Chapter Six: Wave Motion The student can identify wave motion, standing waves. The student can classify mechanical waves into transverse and longitudinal waves.			
Twenty-first	2 hours	The student can mention the properties of wave motion.			
Twenty-second and twenty-third	2 hours	The student can calculate the speed of a transverse wave on a stretched string. The student can show the mathematical representation of a wave.	String vibration 1. Speed of the wave traveling in the string, 2. Reflection of the string waves from the fixed end, 3. Motion in a string fixed at both ends, Applications of string vibration: a. Sonometer, b. Mersenne's law, Wire tension, 6. Power and intensity in sound, Decibel scale, 8. Ba		

Twenty-fourth	2 hours	The student can determine the phase and phase difference. The student can write the differential equation for simple harmonic waves. The student can explain the theory of vibration for a stretched string of finite length. Chapter Seven: Sound Waves in Gases The student can describe the adiabatic behavior of a longitudinal wave. The student can calculate the velocity of a longitudinal wave in a gas. The student can explain Laplace's correction. The student can explain the effect of humidity, temperature and pressure on the velocity of sound. The student can explain the difference between the energy density of a sound wave and the intensity of a sound wave. The student can explain in his own words the interference of sound waves. The student can compare two waves of equal amplitude and frequency that travel in the same direction, and the interference of two	concepts in the musical scale: a. Loudness, b. Tone, Pitch. Some phenomena related to the propagation of sound in the air Doppler effect, the phenomenon of reflection in sound and echo, the phenomenon of diffraction in sound		
Twenty-fifth and Twenty-sixth	2 hours				
Twenty-eighth and	2 hours				

Twenty-nineteenth	2 hours	waves of equal frequency but different in initial phase and amplitude that travel in the same direction. Chapter Eight: String Vibration The student can know: the sonometer string vibration, with conduction. The student can explain Mersenne's law. The student can calculate the velocity of a wave traveling a string. The student can explain the reflection of string waves from a fixed end. The student can give applications of string vibration. The student can explain the importance of using the decibel scale. The student can distinguish between power and intensity in sound. The student can know the basic concepts in the musical scale.			
Thirtieth	2 hours	Chapter Nine: Some phenomena related to the propagation of sound in the air. The student can explain the phenomenon: Doppler in sound, reflection in sound, echo in sound, diffraction in sound			

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11. Course Evaluation

The grade is distributed out of 100 according to the tasks assigned to the student, such as daily preparation, daily, oral, monthly, written exams, and reports. The final grade of 100 is divided into:

Annual effort 40 and final exam 60 points

Effort is divided into monthly exams for each semester, two or more exams. Exam grade is out of 10 points

Daily exam is 5 points

Daily participation and preparation 5 points

Research or report 5 points

Active attendance and class participation 5 points, then divided over the two semesters, so the effort is 40 points.

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Sound Physics and wave motion - Dr. Am Abdul Razzaq Karjeh - Directorate of Dar Kutub for Printing and Publishing - University Mosul - Deposit number in the National Library Baghdad 9 for the year 1987.
Main references (sources)	Sound and Wave Motion - Dr. Subhi Kar Hassoun - Directorate of Dar Al-Kutub Printing and Publishing - University of Mosul Deposit No. in the National Library in Baghdad 767 for the year 1986.
Recommended books and references (scientific journals, reports...)	All books that address and address issues sound and wave motion.
Electronic References, Websites	Search using Google or any other search engine under the phrase sound and wave motion.

Computers – First Level (Morning and Evening)

1. Course Name:
Computers, Second Year
2. Course Code:
509080206
3. Semester / Year:
Annual/2024
4. Description Preparation Date:
30/10/2024
5. Available Attendance Forms: Bachelor
In-Person/Weekly
6. Number of Credit Hours (Total) / Number of Units (Total)
90 hours / 180 units
7. Course administrator's name (mention all, if more than one name)
1 –1. Salam Iyad Hussein, Email: salamayad.77@uomustansiriyah.edu.iq 2. Suad Mohsen Saber, Email: suaad.m.saber@uomustansiriyah.edu.iq
8. Course Objectives
1. Enable students to familiarize themselves with Microsoft Excel, a part of the Microsoft Office suite. 2. Enable students to apply scientific methods and techniques in solving academic and professional problems. 3. Enable students to use software legally and securely, and understand how to protect computers from security threats like viruses. 4. Align theoretical knowledge with practical application in computer science. 5. Stay updated with the latest developments in computer science.

9. Teaching and Learning Strategies

Strategy

- Using modern teaching strategies (cognitive and metacognitive strategies).
- Utilizing contemporary educational models in teaching.
- Assigning students some activities and homework, including practical reports, and presenting them to peers in class.
- Allocating a portion of the grade for extracurricular activities.
- Managing practical sessions in a way that emphasizes the importance of time management.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Chapter 1: Running MS-Excel 2010	How to run Excel in multiple ways	□ Lecture Delivery Method	□ الاختبارات التحريرية Written Tests
2	3	Excel Interface	A detailed explanation of all parts of the interface	□ Video Lectures □ Documentaries	□ Oral Tests □ Daily Quizzes
3	3	Lab	Practical implementation of running the Excel program	□ Discussion Sessions	□ Reports and Seminars

4	3	File Tab and Home Tab	How to handle the file, copy it, and modify its properties		
5	3	Text, Instructions, and Questions Tab	How to print text and change its type		
6	3	Lab	Practical implementation of the previous lectures on the computer		
7	3	Monthly Exam (1) for the First Semester	Monthly Exam (1) for the First Semester		
8	3	Chapter 2: Inserting Objects	How to insert images into the Excel file		
9	3	Tables	Organizing tables in an Excel file		
10	3	Lab	Practical implementation of the previous lectures on the computer		
11	3	Illustrative Drawings	How to draw within the Excel		

			file		
12	3	Monthly Exam (2) for the First Semester	Monthly Exam (2) for the First Semester		
13	3	Charts and Links	How to create hyperlinks between files		
14	3	Text	Editing automatic text		
15	3	Lab	Practical implementation of the previous lectures on the computer		
16	3	Symbols and Questions	Inserting symbols in Excel cells		
17	3	Lab	Practical implementation of the previous lectures on the computer		
18	3	Spring Break	Spring Break		
19	3	Chapter 3: Creating Mathematical Formulas	Implementing fractional mathematical formulas		
20	3	Formulas Tab	Inserting		

			standard formulas in Excel		
21	3	Lab	Practical implementation of the previous lectures on the computer		
22	3	Creating Mathematical Equations	How to activate mathematical formulas for all numeric entries		
23	3	Data Tab	Sorting and analyzing input data		
24	3	Exam (1) for the Second Semester	Exam (1) for the Second Semester		
25	3	Review Tab	Reviewing statistical errors and correcting them		
26	3	Lab	Practical implementation of the previous lectures on the computer		
27	3	View Tab	Explaining how to		

			view data in Excel		
28	3	Lab	Practical implementation of the previous lectures on the computer		
29	3	Monthly Exam (2) for the Second Semester	Monthly Exam (2) for the Second Semester		
30	3	Final Exams			

11. Course Evaluation

- **Grade Distribution:** Out of 100, based on tasks assigned to the student such as daily preparation, daily quizzes, oral exams, monthly exams, written exams, reports, etc.
 - **First Semester Exam:** 20 points
 - **Second Semester Exam:** 20 points
 - **Annual Effort:** 40 points

Activities and Tests: Daily quizzes, monthly exams, daily preparation

- **Final Exam:** 60 points

12. Learning and Teaching Resources

Required textbooks	• "Fundamentals of Computers and Their Applications (Part Three) MS- Excel 2010" ◦ Authored by: Dr. Ghassan Hamid AbdulMajid, Dr. Ziad Mohamed Aboud
Main references	

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

Course Description Form

• Course Name and Stage:
Psychology / Second Stage
• Course Code:
509080208
• Semester / Year:
Annual / 2024/2025
• Description Preparation Date:
30/10/2024
• Available Attendance Forms: Bachelor
Weekly/Attendance
• Number of Credit Hours (Total) / Number of Units (Total)
90 hours/week / 180 units
• Course administrator's name (mention all, if more than one name)
Dr. Rana Hussein Omran Attia Al–Abadi
• Course Objectives
Cognitive Objectives for Learning Developmental Psychology: Understanding developmental psychology and the objectives of developmental psychology Skills-based Objectives: Enabling students to acquire scientific research skills and work on transferring and presenting information related to developmental psychology (research and reports), as well as using smart electronic tools to develop students' skills in teaching methods. Affective Objectives: Developing students' ability to take responsibility during study and encouraging students to

help their peers and build self-confidence.					
• Teaching and Learning Strategies					
Strategy	Using Modern Strategies in Teaching (Cognitive Strategies and Fawq)				
	Using Modern Educational Models in Teaching				
	The student follows activities and environmental assignments that the teacher presents based on scientific foundations and presents them to the lecture.				
	Allocating a percentage of the grade for classroom activities.				
	The practical lecture is organized in a way that makes the student feel the importance of organizing time.				
• Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method

1	3	Cognitive Objectives: • That the student learns what educational psychology is and how it is studied Skill Objectives: • That the student can interpret educational phenomena and the most important factors affecting student learning • Among the skill objectives is using research skills in scientific research Emotional Objectives: • Developing the student's ability to take responsibility and help students	Concepts related to educational psychology according to time period • Psychology concept, its principles and general foundations	• Lecture method • Brainstorming • Mental mapping • Applied workshops	1. Written tests 2. Oral tests 3. Daily tests 4. Reports
2	3	Factors affecting growth			
3	3	Methods of research in psychology of growth			
4	3	Growth theories			
5	3	Childhood stage			
6	3	Adolescence stage			

7	3	First university exam			
8	3	Adulthood stage			
9	3	Adolescence stage			
10	3	Adolescence crisis			
11	3	Society of events			
12	3	Behavioral patterns in basic and applied sciences			
13	3	Academic and applied thinking			
14	3	Second exam			
15	3	Stages of hidden growth			
16	3	Gender (masculine, feminine, neuter)			
17	3	Sexuality			
18	3	Research methods in psychology of growth			
19	3	Glands and hormones			
20	3	Fear and its impact on individual behavior			
21	3	Third exam			
22	3	Behavioral factors in behavior			
23	3	Behavior (its definition, types)			

24	3	Historical development of psychology of growth			
25	3	Psychological development of psychology of growth			
26	3	Experimental method			
27	3	Most important problems of society and their impact on growth factors			
28	3	Monthly exam three			
29	3	Differences between genders in growth			
30	3	Fourth exam			

• Course Evaluation

Distribution of grades out of 100 according to the assigned tasks such as daily preparation and daily, weekly and monthly tests, etc.

First Semester Exam 20 grades | Second Semester Exam 20 grades

Activities, tests and monthly preparation 40 grades

Daily, weekly and monthly tests and preparation 60 grades

• Learning and Teaching Resources

Required textbooks	Does not exist
Main references	Book of General Psychology, Dr. Khadija Hussein Salman
Recommended books and references (scientific journals, reports...)	Ismail Ibrahim and the Mujahideen, Ali, Sam Tawfiq (2014): Methods of Teaching and Thinking, 1st edition, Qandil House for Printing, Publishing and Distribution, Amman, Jordan

Electronic References, Websites	Does not exist
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Subject : Secondary Education - For Morning and Evening Studies
(Second Stage)

1. Course Name:
Secondary Education - For Morning and Evening Studies (Second Stage)
2. Course Code:
509080209
3. Semester / Year:
Annual / 2024 – 2025
4. Description Preparation Date:
30 / 10 /2024
5. Available Attendance Forms: Bachelor
Weekly attendance (for bachelor degree students)
6. Number of Credit Hours (Total) / Number of Units (Total)
2 weekly hours / 36 hours per course
7. Course administrator's name (mention all, if more than one name)
1 – Prof. Dr. Dhurgham Jabbar Hmood (morning studies) 2– Prof. Dr. Ismael Musa Hamedi (evening studies)
8. Course Objectives
Empowering young people who have completed primary school and are entering secondary school to develop their physical, moral, and spiritual personalities. Developing their knowledge of Arab-Islamic culture. Developing the skill of conscious thinking. Providing students with a general understanding of their rights and responsibilities. Distinguishing between types of educational supervision. Consolidating previously discovered information and experiences and linking them to new information and experiences. Providing students with various life skills (self-learning skills and cooperative learning skills).

Distinguishing between different types of education compared to secondary education in Iraq.

Distinguishing between the different roles of school head-teachers and understanding the goals of successful classroom management.

Cognitive Objectives

1. To enable students to understand different secondary education systems and compare them with the Iraqi education system.
2. To diversify knowledge and information from various and diverse sources to enable students to understand the subject.
3. To familiarize students with the general objectives of secondary education.
4. Distinguish students between the stages of secondary education in Iraq.
5. Enabling students to understand the patterns of secondary education.
6. Providing students with the most important innovations in secondary education.
7. Comparing secondary education in the United States, England, France, and Japan.
8. Explaining the concept of educational administration.
9. List the types of traditional and modern schools of administrative thought.
10. Explain the difference between school management, classroom management, and educational management.
11. Identify the skills of a school principal.
12. Clarify the objectives of classroom management.
13. List the most important duties of a school principal related to administrative and technical aspects.
14. Distinguish between the various functions of educational management.
15. Differentiate between the types of educational supervision and the characteristics of each type.

Skill-specific objectives of the course:

1. Develop various life skills among students, including self-learning, critical thinking, collaborative learning, and exchanging opinions with others.
2. Encourage students to think scientifically and objectively during experimentation.
3. Empower students to utilize dialogue and discussion skills.

4. Encourage students to learn the skills of investigation and research while being assigned assignments.
5. Apply e-learning skills and leverage them to develop themselves and keep pace with educational developments.

9. Teaching and Learning Strategies

Strategy

- 1- Presentation method .
- 2- E-learning and the use of various electronic media in the lecture.
- 3- Various interaction methods, including discussion, dialogue, and problem-solving.
- 4- Employment of modern educational methods.
- 5- Emphasize the theoretical aspects of the subject and attempt to delve deeply into its content to achieve understanding.
- 6- Writing a research paper .
7. Learning in multiple groups within the classroom and assigning them assignments. The teacher's role is to guide, advise, and provide feedback.
8. The need to encourage students to participate in awareness workshops and seminars, given their importance to them.
9. Periodic visits to the library to review up-to-date resources for the subject matter.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	- Enabling young people who have completed primary school and are	Introduction to Teaching and Learning	1- Problem-solving strategy. 2- Cooperative	1. Use authentic or

		entering secondary school to develop their physical, moral, and spiritual personalities. - Developing their knowledge of Arab-Islamic culture. - Developing the skill of conscious thinking. - Providing students with a general understanding of their rights and responsibilities. - Distinguishing between types of educational supervision. - Consolidating previously discovered information and experiences and linking them to new information and experiences. - Providing students with various life skills (self-learning skills and cooperative learning skills). - Distinguish between different types of education compared to secondary education in Iraq. - Distinguish between the different roles of school principals and review the	Secondary Education • Its Concept and Objectives Educational Innovations in Secondary Education	learning strategy. 3- Questioning strategy and how to receive students' answers. 4- Lecture method using discussion, dialogue, and interaction between professor and student. 5. Preparing reports on topics the professor deems worthy of student research. 6. Using traditional and electronic educational methods. 7. Directing students to various resources to complete their assignments, including the central library and the college library. 8. Taking into account the	alternative assessment methods. 2. Daily exams and their scoring method. 3. Continuou s oral and written exams throughout the academic year. 4. Emphasize the writing of reports on the course content. 5. Ensure attendance , follow up on absent students, identify their problems,
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		goals of successful classroom management.		human aspect when dealing with students and encouraging them to persevere and work hard. 9- Delivering awareness lectures through the college's guidance unit. 10- Conducting studies in the field of specialization to serve the community and the educational institution where the university professor works.	and address them. 5. The necessity of reviewing each lecture and continuously preparing for any exams required by the professor. 6. Classroom and extracurricular assignments. 1. Tests, daily or monthly. 7. Diagnosing individual differences among
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					students. 8. Assessment questions before the start of the lecture to determine the students' knowledge and relate it to the new lesson. 9. Formative assessment questions during the lecture to identify weaknesses and strengths. 10. Report writing and evaluation. 11. Observing and
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					developing students' creativity.
2	2		E-learning Its concept, objectives, characteristics, benefits, and obstacles	=	=
3	2		Direct and indirect e-learning Comparison between e-learning and traditional education Communication and total quality	=	=
4	2		The education system in the United States		
5	2		Secondary education in Britain		
6	2		Secondary education in		

			France		
7	2		Secondary education in Japan		
8	2		First exam in the first semester		
9	2		Educational Administration Contemporary Trends in Administration		
10	2		Management functions: planning, organizing, directing, and supervising Disadvantages of management		
11	2		Management: its concept, nature of management, development of administrative thought, management styles		

12	2		Evaluation		
13	2		Functions and types of evaluation		
14	2		The second exam in the first semester		
15	2		School administration and its concept		
16	2		Management objectives		
17	2		School Head-Teachers' duties related to the administrative aspect		
18	2		School Head – teachers' tasks related to the technical aspect		
19	2		School Head-teachers' skills and qualifications		
20	2		Classroom Management		

			Its Concept , Importance , and Objectives		
21	2		First exam in the second semester		
22	2		Factors for teacher success Classroom interaction		
23	2		The importance of classroom interaction		
24	2		Semester assignment (research activity on secondary education)		
25	2		Flanders System of Classroom Interaction		
26	2		Asking Questions , and Benefits of Asking Questions		
27	2		Question		

			objectives , and Classroom problems		
28	2		Educational Supervision Its Concept, Objectives, and Functions		
29	2		Educational Supervision Methods Foundations of Educational Supervision		
30	2		Parents' Councils Second Exam of the Second Semester		
11. Course Evaluation					
Continuous oral and written exams throughout the academic year. Formative assessment questions during lectures to identify strengths and weaknesses. Report writing and evaluation. Observing and developing students' creativity.					
12. Learning and Teaching Resources					
Required textbooks			Supporting Resources (including the curriculum vocabulary prescribed for secondary education): 1. Al-Najjar, Ramadan Salem (2009). Contemporary Secondary Education, Amman, 1st ed.		

Main references	Suggested References: 1. Ghanima, Muhammad Metwally (2001) Contemporary Arab Education and Scientific Research: New Methods, Dar Al-Masryia Al-Lubnaniyya, Cairo.
Recommended books and references (scientific journals, reports...)	Supporting sources: 1. Al-Najjar, Ramadan Salem (2009). Contemporary Secondary Education, Amman, 1st ed.
Electronic References, Websites	Refer to any website as needed for clarification and support of required information.

Atomic and Molecular Physics – First Level (Morning and Evening)

1. Course Name:
Atomic and Molecular Physics
2. Course Code:
509080301
3. Semester / Year:
Annual/2024
4. Description Preparation Date:
1/10/2024
5. Available Attendance Forms: Bachelor
In-person/Weekly
6. Number of Credit Hours (Total) / Number of Units (Total)
Number of hours: 90 hours / Number of units: 180
7. Course administrator's name (mention all, if more than one name)
1 - Dr. Raghad Ismail Ibrahim 2- Dr. Wasmaa Abdul Sattar Jabbar 3- Dr. Susan Malek Shaqouli
8. Course Objectives
1. Understand the importance of studying atomic physics. 2. Comprehend and understand the vocabulary of the atomic physics curriculum. 3. Be able to define the physical terms specific to atomic physics. 4. Be able to provide examples from everyday life regarding the atomic and molecular structure of materials.
9. Teaching and Learning Strategies
1. Use modern textbooks with colors and pictures 2- Use technology such as data visualization, touch screens, and computers to visualize basic concepts 3. Engage students through discussion and questioning. 4- Provide homework, reports, and seminars.

10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Atomic models blackbody radiation	Chapter One - Atomic Models	Lecture presentation	Asking questions to students during the lecture, giving homework
2	3	Planck's Postulates The Photoelectric Effect. Chapter One Questions Answers First Month Exam	Chapter One - Atomic Models	Lecture presentation	Asking questions to students during the lecture, giving homework, Monthly exam
3	3	DeBroglie's hypothesis, Diffraction of Particle, DeBroglie's wave group, Heisenberg's uncertainty principle	Chapter Two - DeBroglie's Hypothesis	Lecture presentation	Asking questions to students during the lecture, giving homework
4	3	Solving second chapter questions, the theory of special relativity, Galileo's transformations	Chapter Two + Chapter Three	Lecture presentation	Asking questions to students during the lecture, giving homework, Monthly exam
5	3	Einstein's postulates Lorenz coordinate transformation Lorenz velocity transformation Length contraction	Chapter Three - Relativity	Lecture presentation	Asking questions to students during the lecture, giving homework
6	3	Dilation of time mass and momentum Relativistic mechanics	Chapter Three - Relativity	Lecture presentation	Asking questions to students during the lecture,

					giving homework
7	3	The relation between momentum and energy in relativity The change of mass with velocity	Chapter Three - Relativity	Lecture presentation	Asking questions to students during the lecture, giving homework
8	3	Solving examples and problems of Chapter Three. Definition of X-rays and their applications	Chapter Three + Chapter Four	Lecture presentation	Asking questions to students during the lecture, giving homework, Monthly exam
9	3	The Continuous spectrum The characteristic spectrum	Chapter Four - X-rays	Lecture presentation	Asking questions to students during the lecture, giving homework
10	3	X-ray diffraction X-ray absorption	Chapter Four - X-rays	Lecture presentation	Asking questions to students during the lecture, giving homework
11	3	Compton scattering solve examples chapter	Chapter Four - X-rays	Lecture presentation	Asking questions to students during the lecture, giving homework
12	3	Solve the questions of the fourth chapter, Monthly exam	Chapter Four - X-rays	Lecture presentation	Asking questions to students during the lecture, giving homework, Monthly exam
13	3	Hydrogen atom Spectral series of hydrogen atom	Chapter Five - The Hydrogen Atom	Lecture presentation	Asking questions to students during the lecture, giving homework
14	3	The Bohr's theory of the hydrogen atom, spectrum of the hydrogen atom	Chapter Five - The Hydrogen Atom	Lecture presentation	Asking questions to students during the lecture,

					giving homework
15	3	Energy levels correction of Nuclear motion The hydrogen spectrum	Chapter Five - The Hydrogen Atom	Lecture presentation	Asking questions to students during the lecture, giving homework
16	3	Inadequacy of classical planetary model of hydrogen atom the principle of correspondence	Chapter Five - The Hydrogen Atom	Lecture presentation	Asking questions to students during the lecture, giving homework
17	3	Solving the questions of Chapter Five: The Spectrum of the Hydrogen Atom	Chapter Five + Chapter Six	Lecture presentation	Asking questions to students during the lecture, giving homework, Monthly exam
18	3	Sommerfeld's relativistic model quantum numbers	Chapter Six - Atomic Spectra	Lecture presentation	Asking questions to students during the lecture, giving homework
19	3	Magnetic quantum number Orbital magnetic quantum number	Chapter Six - Atomic Spectra	Lecture presentation	Asking questions to students during the lecture, giving homework
20	3	magnetic spin quantum number, Total angular quantum number,	Chapter Six - Atomic Spectra	Lecture presentation	Asking questions to students during the lecture, giving homework
21	3	Pauli's exclusion principle, quantum mechanics, relativistic mechanics	Chapter Six - Atomic Spectra	Lecture presentation	Asking questions to students during the lecture, giving homework
22	3	Quantum mechanics and quantum number Zeeman effect, Chapter 6 questions and answers	Chapter Six - Atomic Spectra	Lecture presentation	Asking questions to students during the lecture , giving homework

23	3	Molecular formation Spectra of diatomic molecule	Chapter Seven - Molecular Structure and Spectra	Lecture presentation	Asking questions to students during the lecture, giving homework
24	3	Diatomic molecular spectra Rotational spectra of diatomic molecules	Chapter Seven - Molecular Structure and Spectra	Lecture presentation	Asking questions to students during the lecture, giving homework
25	3	Solve examples on the topic of vibrational spectra of molecules	Chapter Seven - Molecular Structure and Spectra	Lecture presentation	Asking questions to students during the lecture , giving homework
26	3	Vibrational energy vibrational and rotational energy calculations	Chapter Seven - Molecular Structure and Spectra	Lecture presentation	Asking questions to students during the lecture, giving homework
27	3	Electronic spectrum, vibrational and rotational electronic energy calculations	Chapter Seven - Molecular Structure and Spectra		Asking questions to students during the lecture, giving homework
28	3	Electronic spectrum, vibrational and rotational electronic energy calculations	Chapter Seven - Molecular Structure and Spectra		Asking questions to students during the lecture, giving homework
29	3	Total Molecular Energy and its calculations Molecular vibrational spectra	Chapter Seven - Molecular Structure and Spectra	Lecture presentation	Asking questions to students during the lecture, giving homework
30	3	Chapter 7 Problem Solving Monthly Exam	Chapter Seven - Molecular Structure and Spectra	Lecture presentation	Asking questions to students during the lecture, giving homework, Monthly exam

11. Course Evaluation	
Formative assessment (40% (homework 8% + monthly exams 12% + reports 8% + practical 12%)) Final (theoretical+ practical) (60%)	
12. Learning and Teaching Resources	
Required textbooks	مفاهيم الفيزياء الحديثه - تاليف د. عبدالمنعم مشكور
Main references	الفيزياء الذريه – تاليف طالب ناهي الخفاجي كتاب الفيزياء الذريه والجزيئيه – تاليف موسى عبدالمجيد (2019)
Recommended books and references (scientific journals, reports...)	Introduction to Atomic and Nuclear Physics, Semat and Albright, Fifth Edition.
Electronic References, Websites	https://www.alfreed-ph.com/2016/09/Books-atomic-and-nuclear-physics-pdf.html

Course Description Form

1. Course Title and Level:	
Thermodynamics / Third Level	
1.	2. Course Code:
509 08 0302	
2.	. Semester/Year: Annual
. Semester/Year: Annual	
3.	4. Date this description was prepared:
10/1/2024	
4.	5. Available Attendance Formats:
In-person / Weekly	
5.	6. Number of Class Hours (Total) / Number of Units (Total):
Number of Hours: 90 Hours / Number of Units: 180	
6.	7. Name of Course Supervisor (if more than one name is provided)
1. Course Objectives 7. Professor . Dr. Nabil Mubarak Mirza 8. Assistant Professor Hiyam chaseb Majed 9. Assistant Professor Janan Akhlati	
10. Thermodynamics is concerned with the study of thermodynamics, a science concerned with the study of the physical phenomena in which thermal energy is transferred between bodies at different temperatures. It studies the concepts of temperature, heat, and internal energy from a macroscopic perspective, i.e., studying the changes that occur in a substance by observing changes in volume, pressure, and temperature. Thermal phenomena can also be studied and understood from a microscopic perspective, i.e., by studying the changes that occur in the molecules of a substance.	
Teaching and learning strategies ..11	
1/ .Teaching and Learning Strategies -Discussion 2/ .Rely on the main reference material, using PowerPoint slides and a smart board template. 3/ .Simple visual aids 4/ .Connect the material to reality .5/Develop a plan for posing questions for daily and monthly exams 6/ .Use various testing and examination methods, both oral and written, in addition to reports .7/Learning methods include maintaining affective objectives, such as asking surprise questions, initiating collaborative discussion among students, and more.	

Course structure					
.12					
Evaluation method	Learning method	Name of unit or topic	Required learning outcomes	Hours	Week
Daily, oral, and written exams (in class) Solving problems - for each chapter Periodic monthly - exams	Smart Board - - Discussion - Connecting the material to reality Developing - a plan for asking questions, setting questions, and conducting daily quick tests	Chapter One: General Introduction	The student can distinguish between the types of thermodynamic systems.	3	1
Daily, oral, and written exams (in class) Solving problems - for each chapter Periodic monthly - exams	Smart Board - Discussion - Connecting the material to reality Developing - a plan for asking questions, setting questions, and conducting daily quick tests	Chapter One: General Introduction	To know - thermodynamic processes To explain - temperature scales.	3	2
Daily, oral, and written exams (in class)	Smart Board - Discussion - Connecting	Chapter One: General Introduction	Distinguish between - different types of thermometers.	3	3

Solving problems - for each chapter Periodic monthly - exams	the material to reality Developing - a plan for asking questions, setting questions, and conducting daily quick tests		Distinguish between - temperature systems and how to calculate them.		
Daily, oral, and written exams (in class) Solving problems - for each chapter Periodic monthly - exams	Smart - Board - Discussion - Connecting the material to reality Developing - a plan for asking questions, setting questions, and conducting daily quick tests	Chapter Two: The Equation of State and the Ideal Gas	The student can: Know the equation of - state for an ideal gas. .	3	4
Daily, oral, and written exams (in class) Solving problems - for each chapter Periodic monthly - exams	Smart Board - Discussion - Connecting the material to reality Developing - a plan for asking questions, setting questions, and conducting daily quick tests	Chapter Two: The Equation of State and the Ideal Gas	Know the stages of - - compression of an ideal gas.	3	5
Daily, oral, and written exams (in class)	Smart Board - Discussion - Connecting	Chapter Two: The Equation of State and the Ideal Gas	Know the equation of - state for a real gas.	3	6

Solving problems - for each chapter Periodic monthly - exams	the material to reality Developing - a plan for asking questions, setting questions, and conducting daily quick tests				
Daily, oral, and written exams (in class) Solving problems - for each chapter Periodic monthly - exams	Smart Board - Discussion - Connecting the material to reality Developing - a plan for asking questions, setting questions, and conducting daily quick tests	Chapter Two: The Equation of State and the Ideal Gas	Know the stages of - compression of a real gas. Solve a set of questions -	3	7
Daily, oral, and written exams (in class)	Smart Board - Discussion - Connecting the material to reality Developing - a plan for asking questions, setting questions, and conducting daily quick tests	Chapter Three: Work and the First Law of Thermodynamics	The student can calculate the work done during various thermodynamic processes.	3	8
- Solving problems for each chapter	Smart Board - Discussion - Connecting the material to reality	Chapter Three: Work and the First Law of Thermodynamics	To know the first law. -	3	9

	Developing - a plan for asking questions, setting questions, and conducting daily quick tests				
Daily, oral, and written exams (in class) Solving problems - for each chapter Periodic monthly - exams	Smart Board - Discussion - Connecting the material to reality Developing - a plan for asking questions, setting questions, and conducting daily quick tests	Chapter Three: Work and the First Law of Thermodynamics	To know the concept - of internal energy of gases.	3	10
Daily, oral, and written exams (in class) Solving problems - for each chapter Periodic monthly - exams	Smart Board - Discussion - Connecting the material to reality Developing - a plan for asking questions, setting questions, and conducting daily quick tests	Chapter Three: Work and the First Law of Thermodynamics	To know the concept - .of heat capacity.	3	11
Daily, oral, and written exams (in class) Solving problems - for each chapter Periodic monthly - exams	Smart Board - Discussion - Connecting the material to reality Developing - a plan for	Chapter Three: Work and the First Law of Thermodynamics	To understand the - concept of a state function. To solve questions - related to the above concepts.	3	12

	asking questions, setting questions, and conducting daily quick tests				
Daily, oral, and written exams (in class) Solving problems - for each chapter Periodic monthly - exams	Smart Board - Discussion - Connecting the material to reality Developing - a plan for asking questions, setting questions, and conducting daily quick tests	Chapter Four: The Second Law of Thermodynamics	The student can Know the second law - of thermodynamics.	3	13
Daily, oral, and written exams (in class)	Smart Board - Discussion - Connecting the material to reality Developing - a plan for asking questions, setting questions, and conducting daily quick tests	Chapter Four: The Second Law of Thermodynamics	To learn the working - principle of the thermodynamic machine.	3	14
- Solving problems for each chapter	Smart Board - Discussion - Connecting the material to reality Developing - a plan for asking questions,	Chapter Four: The Second Law of Thermodynamics	To learn the principle - of thermodynamic machine efficiency.	3	15

	setting questions, and conducting daily quick tests				
Daily, oral, and written exams (in class) Solving problems - for each chapter Periodic monthly - exams	Smart Board - Discussion - Connecting the material to reality Developing - a plan for asking questions, setting questions, and conducting daily quick tests	Chapter Four: The Second Law of Thermodynamics	To learn the working - principle of the Carnot machine.	3	16
Daily, oral, and written exams (in class) Solving problems - for each chapter Periodic monthly - exams	Smart Board - Discussion - Connecting the material to reality Developing - a plan for asking questions, setting questions, and conducting daily quick tests	Chapter Four: The Second Law of Thermodynamics	Learn how a gasoline - engine works. Learn about an auto - engine and a diesel engine. Solve a series of - questions.	3	17
Daily, oral, and written exams (in class) Solving problems - for each chapter Periodic monthly - exams مراجعة	Smart Board - Discussion - Connecting the material to reality Developing - a plan for asking questions, setting questions, and conducting daily quick tests	Chapter Five: Entropy	The student can know entropy. -	3	18

	and conducting daily quick tests				
Daily, oral, and written exams (in class) Solving problems - for each chapter Periodic monthly - exams	Smart Board - Discussion - Connecting the material to reality	Chapter Five: Entropy	To be able to - calculate the entropy of different thermodynamic processes.	3	19
Daily, oral, and written exams (in class) Solving problems - for each chapter Periodic monthly - exams	Developing - a plan for asking questions, setting questions, and conducting daily quick tests	Chapter Five: Entropy	To know the concept - of entropy of the universe and solve examples	3	20
Daily, oral, and written exams (in class) Solving problems - for each chapter Periodic monthly - exams	Smart Board - Discussion - Connecting the material to reality Developing - a plan for asking questions, setting questions, and conducting daily quick tests	Chapter Five: Entropy	To calculate the - entropy of an ideal gas.	3	21
Daily, oral, and written exams (in class) Solving problems - for each chapter Periodic monthly - exams	Smart Board - Discussion - Connecting the material to reality	Chapter Five: Entropy	Solve a set of - questions that connect the previous chapters.	3	22
Daily, oral, and written exams (in class)	Developing - a plan for asking questions,	Chapter Six: Pure and Word materials	The student can distinguish between the phases of pure substances.	3	23

Solving problems - for each chapter Periodic monthly - exams	setting questions, and conducting daily quick tests				
Daily, oral, and written exams (in class) Solving problems - for each chapter Periodic monthly - exams	Smart Board - Discussion - Connecting the material to reality Developing - a plan for asking questions, setting questions, and conducting daily quick tests	Chapter Six: Pure and Word materials	To list the properties - of pure substances.	3	24
Daily, oral, and written exams (in class) Solving problems - for each chapter Periodic monthly - exams	Smart Board - Discussion - Connecting the material to reality Developing - a plan for asking questions, setting questions, and conducting daily quick tests	Chapter Six: Pure and Word materials	To describe the - behavior of pure substances.	3	25
Daily, oral, and written exams (in class) Solving problems - for each chapter Periodic monthly - exams	Smart Board - Discussion - Connecting the material to reality Developing - a plan for asking questions, setting questions, and conducting daily quick tests	Chapter Six: Pure and Word materials	To derive Clapeyron's - equations. To solve applications - and problems of Clapeyron's equations.	3	26

	and conducting daily quick tests				
Daily, oral, and written exams (in class) Solving problems - for each chapter Periodic monthly - exams	Smart Board - Discussion - Connecting the material to reality	Chapter Seven: The Kinetic Theory of Gases	The student can distinguish transitional phenomena.	3	27
Daily, oral, and written exams (in class) Solving problems - for each chapter Periodic monthly - exams	Developing - a plan for asking questions, setting questions, and conducting daily quick tests	Chapter Seven: The Kinetic Theory of Gases	To explain the - relationship between pressure and temperature.	3	28
Daily, oral, and written exams (in class) Solving problems - for each chapter Periodic monthly - exams	Smart Board - Discussion - Connecting the material to reality	Chapter Seven: The Kinetic Theory of Gases	To know the mean - free path.	3	29
Daily, oral, and written exams (in class) Solving problems - for each chapter Periodic monthly - exams	Developing - a plan for asking questions, setting questions, and conducting daily quick tests	Chapter Seven: The Kinetic Theory of Gases	To learn the - phenomenon of thermal conduction. To solve a set of - questions.	3	30

Course Evaluation .11

The grade is distributed out of 100 based on the student's assigned tasks, such as daily preparation, report writing, oral and written exams, and the final exam. The distribution is as follows:
 points for the first semester 20
 points for the second semester 20
 points for the final exam 60

Learning and teaching resources .12

Heat and Thermodynamics Translated by Dr. Muhyiddin Abbas and Dr. Hussein Al- yeh, 1987, Mosul University Press	Required textbooks (methodology if (any)
Thermal kinetics and the kinetic theory of gases. Dr. - Abdul Rahman Mahmoud Al-Jumaili, Dr. Mu'ayyad Gabriel, Dr. Musa Abbas Muhammad, 1991, Mosul University Press 2- Heat and Thermodynamics, Dr. Ramzi Hanna Misho and Dr. Hashim Abboud Qasim, 1984. 3- Heat and Thermodynamics, Dr. Saeed Khader and Amna Ahmed Ramzi, 1978. 4- Statistical Mechanics, Musa Abbas Muhammad, Dr. Mu'ayyad Jibra'il and Dr. Abdul Rahman Al-Jumaili, 1991. Mosul University Press	Main references (sources)
5- Engineering Thermodynamics , by Tarik Al- Shemmeri, 2010	Recommended supporting books and references (scientific journals, reports...)

Course Description Form

1. Course name and stage:
Electronics Third Stage
2. Course code :
509 08 03 03
3. Semester/Year: Annual
year
4. Date of preparation of this description:
10/30/2024
5. Forms of attendance available:
In-person/weekly
6. Number of hours (total) / Number of units (total)
90 hours / 180 units
7. Name of the course leader (if more than one name mentioned)
Prof. Dr. Tariq Jaffar Alwan Prof. Dr. Hassan Abdul Saheb Hadi
8. Course objectives
Electronics is one of the scientific subjects that describe the movement of electrons in materials and determine their type in terms of their ability to conduct electricity, so that it deals with semiconductor materials of pure and doped types, the structure of energy beams and the mechanism of current flow for each type of them. This course also studies diodes and transistors formed by combining different semiconductor materials to form the required electronic circuit parts. Finally, the basic components (diodes and transistors) are applied in many applications, including power supply circuits and feedback circuits used in oscillators, amplifiers, and integrated circuits.
9. Teaching and Learning Strategies
The electronics course taught to students of the Physics Department at the Faculty of Education requires the adoption of teaching and learning strategies that integrate deep theoretical understanding with concrete practical application, commensurate with the student's future role as a teacher. It is important that concepts are presented in an interactive manner, where the professor starts by explaining the theoretical basics such as the characteristics of electronic components (diode, transistor, resistors...) using demonstrations and interactive drawings, and then moves to practical applications by implementing circuits in the laboratory. Problem-based learning is one of the most effective methods, as the teacher can present a real-life issue (such as a simple circuit failure) and ask students to analyze it and design a solution, which stimulates critical thinking and linking concepts. It is also recommended to use project-based learning, such as asking students to design a simple project such as a transistor amplifier, giving them first-hand experience in design and construction. The importance of cooperative learning should not be overlooked, where students are divided into groups and work together to solve exercises or implement circuits, which develops teamwork skills.
10. Course structure

Week	Hours	Required Learning Outcomes	Module Name or Topic	Learning method	Assessment method
1	3	The student understands the basic concepts of diodes and fuses and interprets the work function	Basic concepts in electronics - Thermionic valves. - Thermionic emission. - Diode characteristics. - Work function. Static and dynamic resistors.	Interactive Lecture + Demonstration + Discussion	Short quiz + Oral analysis question
2	3	Distinguish between conducting, insulating, and semiconducting materials.	Semiconductor physics - Representation of the atom and its levels. - Energy packets for crystals. - Modeling energy packets. - Conductors, insulators and semiconductors. Pure semiconductors.	Lecture + Use of illustrations + Individual exercise	Short written test + Class participation assessment
3	3	Calculate the concentration of holes and electrons and understand current in doped semiconductors	- Calculate electrical conductivity in pure semiconductors. - the concentration of electrons and holes in pure semiconductors - doped semiconductors. - Doped semiconductors are of the positive and negative type. Current flow in impurity semiconductors.	Collaborative Learning + Problem Solving	Worksheet + Digital Testing
4	3	The student should explain the principle of PN junction and read the characteristic curve	bicrystalline - PN junction dichroism. - PN junction bias. - The characteristic curve of a PN junction. PN junction energy diagram.	Practical demonstration using simulation + Theoretical explanation	Practical test + Group discussion
5	3	The student should analyze the diode circuit, calculate the barrier voltage and describe the effect of heat	- Calculate the barrier voltage. - The equivalent circuit of a crystal diode. - Analyze the circuit of a diode (load line). The effect of temperature	Problem-based learning + infographic	Mini-Report + Illustration and Commentary

			on the diode.		
6	3	Distinguish between types of binaries and their use in electronic applications	· Zener diodes. · Tunneling diode. · Light-emitting diodes. · Variable capacitance diode. · Cold cathode diode.	Demonstration + Video Tutorial + Simulation	Practical assessment + Theory test
7	3	The student should review basic concepts and practice solving practical problems	· Review and solve questions and problems. First exam for the first course	Problem solving and group discussion	Achievement exam
8	3	The student should know the applications of diodes in orthogonal circuits	uses of crystal diodes · rectifier. · Half-wave rate. · Full-wave rate. Comparison between half-wave and full-wave rate.	Interactive Lecture + Practical Implementation	Theoretical test + Laboratory evaluation
9	3	The student should understand the orthodontic arch and its role in minimizing ripple	· Straightening gantry. · Ripple factor. · Filtration circuits. · Obligation circuits.	Drawing circuits + Practical implementation	Laboratory report + Quiz
10	3	The student should analyze voltage multiplier and voltage regulation circuits	· Voltage multiplier circuit. · Pruning (cutting) circuit. · Voltage regulation. Solve questions and problems.	Small project-based learning	Practical report + Solve questions
11	3	Explain the characteristics of a transistor and how it is connected.	transistor · the basic characteristics of a transistor. · Methods of connecting a transistor. Transistor working areas.	Demonstration + Simulation	Analytical test + Class participation
12	3	The student can distinguish between transistor bonding modes and analyze the characteristics of each	· Advantages of the transistor in common base bonding. · Advantages of the transistor in common-emitter bonding. Characteristics of the transistor in the common collector connection.	Discussion + diagram	Compare Styles + Test
13	3	The student will use the gestation line and hybrid factors to analyze circuits.	· load line. · Characteristics of hybrid factors Second exam for the first course. · State-to-state hybrid factor conversions	Solve questions + Theory Explanation	Worksheet + Written test

			for transistor bonding. olve questions and problems.		
14	3	The student should review the concepts of the first half and prepare for the test	Review and solve questions and problems. Second exam for the first course	Discussion and questions	Theoretical exam
15	3	Explain transistor bias circuits and the concepts of stability.	transistor bias circuits and thermal stability - Transistor bias. - operating point (working) stability. - Transistor bias circuits and stabilization coefficient.	Interactive lecture + Practical application	Lab test + Assessment Report
16	3	The student should know the concept of feedback and its effect on the functioning of circuits.	Back feed - Definition of feedback. - The basic formula for backfeeding. Positive feedback.	Demonstration + Examples	Classroom Questions + quiz
17	3	Distinguish between types of feedback and compare their effects	- Negative feedback. - Types of negative feedback. The effect of feedback on the gain in voltage and current.	Lecture + Analyze circuits	Demonstration + Problem Solving
18	3	Analyze the effect of feedback on noise, distortion, and impedance	- The effect of feedback on frequency response, noise, and distortion. - Analyze the effect of feedback on the input impedance and output impedance of an amplifier. Solve questions and problems.	Draw circuits + Graphical analysis	Written test + Presentation
19	3	The student should explain the working principle of the field effect transistor	field-effect transistor - junction field-effect transistor. - the working principle of the junction field-effect transistor. - metal-oxide field-effect transistor. - Bias methods of junction field effect transistor. Solve questions and problems.	Lecture + Simulation	Oral test + Worksheet
20	3	Students read property curves and derive constants	The characteristic curves of a junction field-effect	Graphical Analysis + Practice	Solve Exercises + Quiz

			transistor. constants for a junction field-effect transistor.		
21	3	Explain the bias of a MOSFET transistor and solve its circuits	- metal-oxide field-effect transistor. - Methods of biasing a junction field-effect transistor.	Lecture + Simulation	Practical assessment + Test
22	3	The student should review the concepts of the second half and prepare for the exam	- Review and solve questions and problems - The first exam of the second course.	Solve questions and discussion	Achievement test
23	3	Explain the principle of oscillation and the types of oscillators.	- oscillators - sinusoidal oscillators. - oscillation conditions.	Theoretical explanation + Practical examples	Theory test + Worksheet
24	3	The student can distinguish between feedback oscillators	Feedback oscillators.	Presentation + Draw circuits	Assessment Presentation + Test
25	3	The student should analyze a phase shift oscillator	phase shift oscillators.	Discuss and analyze circuits	Report + Test Paper
26	3	the student should understand how the Harley and Coulbets oscillators work	- Harley oscillator. - Colpitts oscillator. - Solve questions and problems.	Simulation + Discussion	Practical Drawing + Quiz
27	3	The student should know the concept of integrated circuits and their types	- Integrated circuits - Types of integrated circuits. - Isolating elements from each other in integrated circuits. - Making integrated circuits.	Video presentation + Explanation	Theory test + Report
28	3	The student should explain the components of an integrated circuit	- Composition of a complete integrated circuit. - Integrated capacitors. - Integrated resistors.	Interactive lecture	Worksheet + Discussion
29	3	The student should analyze MOS integrated circuits and conclude their importance	- MOS integrated circuits. - The future of integrated circuits. - Solve exercises and questions.	Analyze circuits + Practical application	Applied Assessment + Test
30	3	The student should review all the topics of the course and prepare for the final exam	Review and solve questions and problems.	Solve questions and exercises	Final exam

11. Course assessment

The electronics course is assessed using a combination of theoretical and practical assessments that ensure the extent to which students achieve the learning outcomes. The assessment process includes periodic written tests (semi-annual and final), continuous assessments through assignments and in-class problem solving, as well as laboratory reports that assess the practical and applied aspect. The assessment is designed to foster a deep understanding of concepts and the ability to analyze

and design electronic circuits, thereby preparing the student to be a competent teacher in the field of applied physics.

12. Learning and Teaching Resources

Required textbooks (methodology, any)

Main References (Sources)

Recommended supporting books and references (scientific journals, reports)

Electronic References, Internet Websi

Subhi Saeed Al-Rawi "**Physics of Electrons**" University of Mosul.

Hassan Mohammed Jawad Al-Sharbati and others "Electronics" University of Baghdad.
Fundamentals of Electronics / Muhammad Farouk - Muhammad Khader Kateb
Basic Electronics by Dr. Muhammad Qaqaqa 2015

<https://www.allaboutcircuits.com>

Analytical Mechanics - Third Level (Morning and Evening Study)

1. Course Name:					
Analytical Mechanics					
2. Course Code:					
509 080 304					
3. Semester / Year:					
Annual/2024					
4. Description Preparation Date:					
30/10/2024					
5. Available Attendance Forms:					
Bachelor					
6. Number of Credit Hours (Total) / Number of Units (Total)					
90					
7. Course administrator's name (mention all, if more than one name)					
1. Prof. Dr. Intesar Hato Hashim 2. Asst. Prof. Dr. Adnan Hashim Mohammed					
8. Course Objectives					
The Analytical Mechanics course aims to enable students to analyze the motion of objects using different coordinate systems, distinguish between various types of coordinates, and understand the mechanics of object movement in one, two, or three directions. Additionally, it aims to develop students' ability to predict the behavior of objects observed in everyday life, understand the mechanisms of motion, and connect these to general laws of motion. Analytical Mechanics encompasses several fundamental concepts, including vectors, scalar quantities, and the mathematical laws governing these quantities. It also examines the velocity and acceleration of particles in polar, spherical, and cylindrical coordinate systems. The course examines the mechanics of object movement by studying the laws of motion and their key properties, including the effects of Earth's gravitational field and central force fields. Furthermore, it covers damped and straightforward harmonic motion under external forces, particle behavior in rotational and translational coordinates, particle collisions, system dynamics, and trajectory determination. Lastly, it introduces Lagrangian and Hamiltonian mechanics, their applications, and analysis of vibrational motion.					
9. Teaching and Learning Strategies					
Strategy		Our main syllabus objectives are to encourage student participation in practical exercises while simultaneously enabling students to make a significant contribution to solving mathematical and real-world problems related to mechanical and analytical sciences. Students will be able to use mathematics as a unique tool in linking physical and mathematical concepts and in developing a foundation of reasoning that can be applied in any situation, such as critical, logical, and systematic thinking. They will also demonstrate objectivity, honesty, and discipline in solving problems. This will be done through preparation, reports, projects, and interactive learning activities.			
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method

1		• The student should be able to define vectors and scalar variables. • The student should be able to perform dot and cross product operations on vectors and understand their applications. • The student should be able to perform triple product operations on vectors. • The student should be able to determine directional angles and use direction cosines in vector analysis.	Chapter One • Vectors. • Vectors addition and subtraction. • Vector products (dot and cross) product and their applications. • Triple product • Directional angles	• Lecture method (Dialogue) • Power Point • (E-learning)	• Daily and monthly quizzes. • Daily assignment • Exercises
2		• The student should be able to differentiate and integrate vectors in different coordinate systems. • The student should be able to define the concepts of position, velocity, and acceleration of a particle.	• Derivation and integration of a vector. • The position vector. • The velocity vector. • The acceleration vector.	• Lecture method (Dialogue) • Power Point • (E-learning)	• Daily and monthly quizzes. • Daily assignment • Exercises
3		• The student should be able to distinguish between tangential and normal components of acceleration.	• Tangential and normal components of acceleration.	• Lecture method (Dialogue) • Power Point • (E-learning)	• Daily and monthly quizzes. • Daily assignment • Exercises
4		• The student should be able to differentiate between various types of coordinate systems. • The student should be able to solve problems related to the mentioned concepts.	• Velocity and acceleration in plane polar, cylindrical and spherical coordinate.	• Lecture method (Dialogue) • Power Point • (E-learning)	• Daily and monthly quizzes. • Daily assignment • Exercises
5		• The student should be able to state Newton's laws of motion. • The student should be able to state Newton's laws of motion.	Chapter Two • Newton's Law of motion. • Mass and Force:	• Lecture method (Dialogue) • Power Point • (E-learning)	• Daily and monthly quizzes. • Daily assignment • Exercises

		• The student should be able to understand linear motion. • The student should be able to define linear momentum.	Newton's Second and Third Law • Linear momentum.		
6		• The student should be able to distinguish between cases where force is constant or varies with position, velocity, and time. • The student should be able to understand the relationship between force and position, and how it affects motion. • The student should be able to define and apply the concepts of kinetic energy and potential energy. • The student should be able to use energy principles to solve problems involving motion and force.	• Rectilinear motion: uniform Acceleration under constant force • The force as a function of position only. • The concept of kinetic and potential energy.	• Lecture method (Dialogue) • Power Point • (E-learning)	• Daily and monthly quizzes. • Daily assignment • Exercises
7		• The student should be able to analyze the horizontal and vertical motion of an object in the presence of a resistive medium. • The student should be able to differentiate between object motions when force is a function of linear velocity and when raised to the second power.	• Variation of gravity with height, Newton's Law of Gravity. • The force as a function of velocity only	• Lecture method (Dialogue) • Power Point • (E-learning)	• Daily and monthly quizzes. • Daily assignment • Exercises
8		• The student should be able to analyze object motion considering variations in Earth's gravity with altitude. • The student should be able to define the concept of terminal velocity.	• The force as a function of time only. • Vertical motion in a resisting medium • Terminal velocity.	• Lecture method (Dialogue) • Power Point • (E-learning)	• Daily and monthly quizzes. • Daily assignment • Exercises

9		• The student should be able to describe the harmonic motion of an object (SHM). • The student should be able to understand the concept of a linear restoring force and Hooke's Law. • The student should be able to derive and use equations of motion for (SHM).	Chapter Three • Linear restoring force, harmonic motion.	• Lecture method (Dialogue) • Power Point • (E-learning)	• Daily and monthly quizzes. • Daily assignment • Exercises
10		• The student should be able to understand energy considerations for harmonic motion. • The student should be able to distinguish between simple harmonic motion, damped harmonic motion, and motion under an external force.	• Energy considerations in harmonic motion. • Damped harmonic motion.	• Lecture method (Dialogue) • Power Point • (E-learning)	• Daily and monthly quizzes. • Daily assignment • Exercises
11		• The student should be able to define resonance and the conditions for its occurrence.	• Forced harmonic motion (Resonance).	• Lecture method (Dialogue) • Power Point • (E-learning)	• Daily and monthly quizzes. • Daily assignment • Exercises
12		• The student should be able to understand energy considerations for damped and forced harmonic motion.	• Energy considerations in forced harmonic motion.	• Lecture method (Dialogue) • Power Point • (E-learning)	• Daily and monthly quizzes. • Daily assignment • Exercises
13		• The student should be able to understand the work principle. • The student should be able to understand and apply the work-energy principle to mechanical systems. • The student should be able to distinguish between conservative and non-conservative forces.	Chapter Four • The work principle. • Conservative forces and force fields.	• Lecture method (Dialogue) • Power Point • (E-learning)	• Daily and monthly quizzes. • Daily assignment • Exercises

14		• The student should be able to define the concept of potential energy and comprehend it in a uniform gravitational field.	• Potential energy function. • The potential for a uniform gravitational field.	• Lecture method (Dialogue) • Power Point • (E-learning)	• Daily and monthly quizzes. • Daily assignment • Exercises
15		• The student should be able to understand the conditions for the existence of potential and the inverse square law of force.	• Conditions for the existence of potential function. • Potential for the Inverse-square law of force.	• Lecture method (Dialogue) • Power Point • (E-learning)	• Daily and monthly quizzes. • Daily assignment • Exercises
16		• The student should be able to define the delta operator, apply it to vectors, understand its physical meaning, and explore its applications. • The student should be able to distinguish between harmonic motion in two and three dimensions.	• The Del operator and its application. • The harmonic motion in two dimensions. • The harmonic motion in three dimensions.	• Lecture method (Dialogue) • Power Point • (E-learning)	• Daily and monthly quizzes. • Daily assignment • Exercises
17		• The student should be able to understand reference frames. • The student should be able to calculate inertial forces.	Chapter Five • Translation of the coordinate system. • Inertial forces.	• Lecture method (Dialogue) • Power Point • (E-learning)	• Daily and monthly quizzes. • Daily assignment • Exercises
18		• The student should be able to analyze the motion of an object within a coordinate system • The student should be able to describe general motion relative to moving (non-inertial) coordinate systems. • The student should be able to understand the effects of rotating reference frames on	• General motion of the coordinate system. • Dynamics of a Particle in a Rotating Coordinate system.	• Lecture method (Dialogue) • Power Point • (E-learning)	• Daily and monthly quizzes. • Daily assignment • Exercises

		particle dynamics. • The student should be able to identify and apply fictitious forces.			
19		• The student should be able to calculate potential energy. • The student should be able to understand and calculate potential energy in a gravitational field. • The student should be able to define and compute gravitational potential at a point in space. • The student should be able to explain and determine gravitational intensity (field strength) and its relation to force and potential.	• The potential energy in a gravitational field. • Gravitational potential. • Gravitational intensity.	• Lecture method (Dialogue) • Power Point • (E-learning)	• Daily and monthly quizzes. • Daily assignment • Exercises
20		• The student should be able to define the concepts of gravitational potential, gravitational intensity, and angular momentum. • The student should be able to calculate potential energy in a central field. • The student should be able to prove that any force in a central field is conservative.	Chapter Six • Introduction. • Potential energy in a general central field.	• Lecture method (Dialogue) • Power Point • (E-learning)	• Daily and monthly quizzes. • Daily assignment • Exercises
21		• The student should be able to determine angular momentum in a central field.	• Angular momentum. • Angular momentum in central field.	• Lecture method (Dialogue) • Power Point • (E-learning)	• Daily and monthly quizzes. • Daily assignment • Exercises
22		• The student should be able to state Kepler's laws. • The student should be able to derive the	• The law of areas. • Kepler's law.	• Lecture method (Dialogue) • Power Point • (E-learning)	• Daily and monthly quizzes. • Daily assignment

		orbital equation and energy of a body in a central field.			• Exercises
23		• The student should be able to understand the stability of an object's orbit.	• Energy equation of the orbit.		
24		• The student should be able to define and calculate the center of mass for a system of particles. • The student should be able to derive and calculate the angular momentum and kinetic energy of a system of particles.	Chapter Seven • Center of mass and linear momentum of a system of particles..	• Lecture method (Dialogue) • Power Point • (E-learning)	• Daily and monthly quizzes. • Daily assignment • Exercises
25		• The student should be able to understand the principle of collisions and their types.	• Angular momentum of a system of particles..	• Lecture method (Dialogue) • Power Point • (E-learning)	• Daily and monthly quizzes. • Daily assignment • Exercises
26		• The student should be able to describe impulse, the motion of a variable-mass object, and the motion of a rocket or projectile.	• Kinetic energy of a system of particles.	• Lecture method (Dialogue) • Power Point • (E-learning)	• Daily and monthly quizzes. • Daily assignment • Exercises
27		• The student should be able to define the concepts of force, momentum, and generalized coordinates and describe an object's motion using them. • The student should be able to use Lagrange's and Hamilton's equations to describe an object's motion.	Chapter Eight • Generalized coordinates. • Generalized force.	• Lecture method (Dialogue) • Power Point • (E-learning)	• Daily and monthly quizzes. • Daily assignment • Exercises
28		• The student should be able to derive Lagrange's equations. • The student should be able to compare Lagrangian and Newtonian approaches	• Lagrange's Equation. • Generalized momentum.	• Lecture method (Dialogue) • Power Point • (E-learning)	• Daily and monthly quizzes. • Daily assignment • Exercises

		in solving classical mechanics problems.			
29		• The student should be able to understand the applications of Lagrange's equations • The student should be able to use Lagrangian mechanics to solve problems involving the Atwood machine.	• Applications of Lagrange's Equation. • The Atwood Machine. • The Double Atwood Machine.	• Lecture method (Dialogue) • Power Point • (E-learning)	• Daily and monthly quizzes. • Daily assignment • Exercises
30		• The student should be able to understand the formulation of Hamiltonian mechanics from Lagrangian mechanics. • The student should be able to define the Hamiltonian as the total energy (in terms of generalized coordinates and momenta). • The student should be able to write and interpret Hamilton's equations of motion. • The student should be able to derive Hamilton's equations.	• The Hamilton's Equations.	• Lecture method (Dialogue) • Power Point • (E-learning)	• Daily and monthly quizzes. • Daily assignment • Exercises

11. Course Evaluation

4 Tests	20%
2 Assignments	10%
2 Report	10%
1 Final exam	60%

12. Learning and Teaching Resources

Required textbooks	• Analytical Mechanics 3^{ed} Edition, by Grant A. Fowels (1977).
Main references	• Analytical Mechanics 7th Edition, by Grant A. Fowels and George L. Cassiday (2005). • Analytical Mechanics, by Nivaldo A. Lemos, Cambridge (2018).
Recommended books and references (scientific journals, reports...)	• Louis N. Hand, and Janet D. Finch, "Analytical Mechanics", Cambridge University Press, (1998). • A Guided Tour of Analytical Mechanics with animations in MAPLE and MATHEMATICA

	by Rouben Rostamian (2014).
Electronic References, Websites	Department's YouTube channel

Complex Functions – Third Level (Morning and Evening)

1. Course Name:	
Complex Functions	
2. Course Code:	
509080305	
3. Semester / Year:	
Annual/2024–2025	
4. Description Preparation Date:	
30/10/2024	
5. Available Attendance Forms:	
Attendance\ Weekly	
6. Number of Credit Hours (Total) / Number of Units (Total)	
2/ 4	
7. Course administrator's name (mention all, if more than one name)	
1. Assist. Prof. Dr. Saadi Raheem Abbas 2. Assist. Prof. Dr. Ali Ne'mah Mohammed 3. Assist. Prof. Dr. Israa Akram Abbas	
8. Course Objectives	
1- The student can distinguish between real numbers and complex numbers and processes that are subject to it. 2- Realize the concept and meaning of complex numbers and how to represent it. 3- Expression of the physical and natural phenomena in the form of a complex quantities. 4- Understanding and knowledge of the complex functions - to understand and study, the limit and integral of complex functions. 5- Understanding of the foundations of complex analysis - the application of complex analysis in solving physical problems.	
9. Teaching and Learning Strategies	
Strategy	The course combines student-centered and instructor-led approaches to build both conceptual understanding and problem-solving fluency in complex analysis. Weekly interactive lectures introduce theory through clear exposition and real-world examples, while multimedia demonstrations (videos, smartphone apps and visualizations) anchor abstract ideas in tangible contexts. Guided problem-based learning, small-group discussions and frequent worked examples encourage

	active engagement, peer exchange and immediate formative feedback. Regular homework, in-class quizzes and iterative reviews consolidate knowledge and reveal misconceptions early, allowing timely remediation. Together, these strategies create a dynamic learning environment that nurtures deep comprehension, analytical thinking and autonomous lifelong learning skills.				
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Understand the concept of complex numbers and perform basic algebraic operations with them	Complex number, Algebraic properties, Solved problems and homework. Physical applications, Video presentation, Solving problems with Smart Phone applications.	Lecture, applied examples, and problem-solving exercises	Homework assignment (graded)
2	2	Use complex conjugates and absolute values in computations; represent complex numbers in the Argand plane	Complex conjugate, complex conjugate properties, Absolute value, vector representation of complex numbers, Solved problems and homework.	Lecture, guided problem-solving exercises	Homework assignment (graded) + short quiz
3	2	Apply complex numbers to solve practical problems and interpret the results in real-world contexts	Solved problems and homework. Physical applications, Video presentation, Solving	Lecture, applied examples, and problem-solving exercises	Homework assignment (graded)

			problems with Smart Phone applications.		
4	2	Demonstrate understanding of complex numbers and algebraic properties from Weeks 1–3	First exam in the first semester	Written examination (in class)	First midterm exam
5	2	Represent complex numbers in polar form and compute powers and roots using De Moivre's theorem	Geometric form of complex number, polar coordinates, power and Roots, solved problems and homework, Physical applications, Video presentation, Solving problems with Smart Phone applications. MCQ's training.	Lecture, applied examples, and problem-solving exercises; in-class quiz practice	Homework assignment (graded)
6	2	Demonstrate understanding of complex number polar forms and related concepts	Second exam in the first semester	Written examination (in class)	Second midterm exam
7	2	Identify and address difficulties in topics from Weeks 1–6; reinforce understanding in preparation for the semester exam	General Review, Solved problems and homework	Class discussion, collaborative problem-solving	Review homework + in-class practice quiz
8	2	Define complex functions; evaluate limits of complex functions and determine continuity at a point	Preface, Complex variables functions, Limits, continuity.	Lecture, guided problem-solving exercises	Homework assignment (graded) + short quiz
9	2	Illustrate complex function mappings and determine continuity	Complex variables functions	Lecture, guided problem-solving exercises	Homework assignment (graded)

		across regions of the complex plane			
10	2	Understand the complex exponential function and its properties; apply e^z in problem-solving scenarios	Complex exponential function and their properties, Physical applications, Video presentation, Solving problems with Smart Phone applications.	Lecture, applied examples, and problem-solving exercises	Homework assignment (graded) + short quiz
11	2	Explain the principal complex logarithm; describe the relationship between e^z and $\ln z$; solve problems involving complex exponents	Complex logarithmic function, The relationship between e^z & $\ln z$, complex exponents, Solved problems and homework, Physical applications, Video presentation, Solving problems with Smart Phone applications.	Lecture, applied examples, and problem-solving exercises	Homework assignment (graded)
12	2	Define complex trigonometric functions and understand their periodicity; solve problems using complex sine and cosine	The trigonometric function, periodic functions, solved problems and homework, Physical applications, Video presentation, Solving problems with	Lecture, applied examples, and problem-solving exercises	Homework assignment (graded) + short quiz

			Smart Phone applications.		
13	2	Understand complex hyperbolic functions and their inverses; solve problems involving hyperbolic sine and cosine	The hyperbolic functions, Inverse functions, solved problems, Physical applications, Video presentation, Solving problems with Smart Phone applications.	Lecture, applied examples, and problem-solving exercises	Homework assignment (graded)
14	2	Demonstrate comprehensive knowledge of all Semester I topics (complex numbers and elementary complex functions)	Comprehensive Exam in the first semester including MCQ's	Written examination (comprehensive test)	Semester I final exam
15	2	Compute derivatives of complex functions using differentiation formulas; differentiate standard complex functions	Derivatives, Differentiation formulas	Lecture, guided problem-solving exercises	Homework assignment (graded)
16	2	Consolidate understanding of complex differentiation topics; prepare for upcoming exam	General Review, Separation of complex functions, Solved problems and Examples	Class discussion, collaborative problem-solving	Review homework + self-assessment quiz
17	2	Apply the Cauchy–Riemann equations to determine if a function is analytic (holomorphic)	Cauchy-Riemann equations, Solved problems and Examples	Lecture, guided problem-solving exercises	Homework assignment (graded)
18	2	Understand the concept of an analytic function and identify regions where a function is	Analytic function, Solved	Lecture, guided problem-solving exercises	Homework assignment (graded) + short quiz

		analytic; solve related problems	problems and homework		
19	2	Demonstrate knowledge of complex differentiation and analytic function topics from Weeks 15–18	First exam in the second semester	Written examination (in class)	First midterm exam (Semester II)
20	2	Determine the harmonic conjugate for a given harmonic function; understand the connection between harmonic functions and analyticity	Harmonic conjugate, Solved problems and homework	Lecture, guided problem-solving exercises	Homework assignment (graded) + short quiz
21	2	Apply Morera's theorem and Liouville's theorem; use Cauchy's Integral Formula to evaluate complex integrals	The Morera's theorem, Liouville's theorem, Cauchy Integral formula, Solved problems and homework. MCQ's training	Lecture, guided problem-solving exercises; in-class quiz practice	Homework assignment (graded)
22	2	Demonstrate understanding of complex integration theorems (Morera's, Liouville's, Cauchy's Integral Formula)	Second exam in the second semester	Written examination (in class)	Second midterm exam (Semester II)
23	2	Test convergence of sequences and series of complex numbers; expand simple functions into Taylor series	Convergence of Sequences and Series, Taylor Series.	Lecture, guided problem-solving exercises	Homework assignment (graded)
24	2	Expand complex functions into Laurent series and analyze series properties; solve problems using Laurent expansions	Observations and Examples, Laurent Series, Further properties of Series, Solved problems and homework	Lecture, guided problem-solving exercises	Homework assignment (graded) + short quiz
25	2	Understand power series representations of functions; examine	Power Series, Uniform convergence,	Lecture, guided problem-solving exercises	Homework assignment (graded)

		criteria for uniform convergence; differentiate and integrate power series term-by-term	Integration and differentiation of power Series.		
26	2	Classify singular points (removable, poles, essential) and determine zeros of complex functions	Multiplication and Division of Series, Solution of equations about the chapter.	Lecture, guided problem-solving exercises	Homework assignment (graded) + short quiz
27	2	Calculate residues at singularities using various methods; use calculated residues to evaluate complex integrals	Classification of singular points, zeroes of function.	Lecture, guided problem-solving exercises	Homework assignment (graded)
28	2	Apply the Residue Theorem to compute complex integrals; solve problems using the residue calculation theorem	Residues, methods of calculation of Residues, Solved problems and homework.	Lecture, guided problem-solving exercises	Homework assignment (graded) + short quiz
29	2	Summarize and communicate a complex analysis topic through a written report and oral presentation; engage in constructive peer feedback	The Residue theorem, The Residue calculation theorem, Solved problems and homework.	Group presentations and class discussion	Assessment of submitted reports and presentation performance
30	2	Demonstrate comprehensive mastery of all topics covered in the course (Semester I & II)	Discuss of Reports	Written examination (comprehensive test)	Semester II final exam

11. Course Evaluation

1. Marking:

First semester			Second semester			Annual pursuit	Final exam
1 st exam	2 nd exam	activity	1 st exam	2 nd exam	activity		
7.5	7.5	5	7.5	7.5	5	40	60

2. Assignments & Activities:

Assignment/Project	Description	Due Date	Marking
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	Homework	There are 12 homework in the semesters	During the Semester	6	
	Report	Physical Applications of Complex Numbers or Functions.	Last week of the Semester II	4	
12. Learning and Teaching Resources					
Required textbooks		J.W. Brown, R.V.Churchill, "Complex Variables and Applications “, 8 th ed. McGraw-Hill Company, New York, 2009. ISBN 978–0–07–305194–9			
Main references		1. Nakhlé H. Asmar, Loukas Grafak, 'Complex Analysis with Applications', Springer Nature Switzerland AG, 2018. 2. M. Boas, "Mathematical Methods in the Physical Sciences", 2ndEd. McGraw-Hill, New York, 1983. 3. M.R.Speigel, S.Lipschutz, J.J. Schiller,D .Spellman, "Schaumes Outline Series: Theory & Problems of Complex Variables, McGraw-Hill, New York, 2009. 4. J.C.Campuzano , " complex Variables : Solved Problems , 2012. 5. D. G. Zill, "A First Course in Complex Analysis with Applications", Jenes and Bartlett publishers, Inc., London, 2003. 6. G.B.Arffen , H.J.Weber and F.E.Harris , " Mathematical Methods for Physicists ", 7th ed. Elsevier , Amsterdam, 2013. ISBN: 978-0-12-384654-9			
Recommended books and references (scientific journals, reports...)					
Electronic References, Websites					

Plasma – First Level (Morning and Evening)

1. Course Name:	
Plasma physics	
2. Course Code:	
509080306	
3. Semester / Year:	
Annual/2024	
4. Description Preparation Date:	
30/10/2024	
5. Available Attendance Forms: Bachelor	
Weekly	
6. Number of Credit Hours (Total) / Number of Units (Total)	
60 hours / Number of units: 120	
7. Course administrator's name (mention all, if more than one name)	
1 – Lec. Dr. Asmaa Mohammed Raoof	
2.Lec. Dr. Raheem LAFTA ALI	
8. Course Objectives	
The curriculum aims to enable students to define plasma and study its most important properties and parameters, as well as study the behavior of particles within fixed and changing electric and magnetic fields. It also covers plasma as a fluid, electrical discharge plasma, plasma systems, plasma diagnostic methods, and important plasma applications.	
9. Teaching and Learning Strategies	
Strategy	Develop a plan for asking questions, setting questions, and setting daily quizzes.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Ability to understand the concept of plasma. Know how plasma exists in nature. Compare the four states of matter.	Introduction, definition of plasma, occurrence of plasma in nature, plasma forms, importance of studying plasma, types of plasma,	– Smart board – Discussion – Connecting the material to reality Developing a plan for g questions, setting ions, and icting daily quick	Daily, oral, and written exams (on the board and on paper) – Solving problems for each chapter on the board – Periodic monthly exams
2	2	Distinguish between gas and plasma. Distinguish between the types of plasma. Determine the importance of studying plasma.	general properties of plasma, Saha equation, plasma parameters, temperature, plasma frequency, Debye shielding, some plasma applications, nuclear fusion		
3	2	State the types of plasma. Distinguish between the types of plasma. Determine the importance of studying plasma. State the types of plasma.	reactors, magnetohydrodynamic generators, plasma jet propulsion.		
4	2	Identify the general properties of plasma. Understand the concept of ionization degree. Interpret the Saha equation for calculating ionization degree.			
5	2	Understand the concept of plasma frequency. Understand the concept of Debye shielding. Identify the effect of temperature on Debye shielding. Distinguish between the types of Debye			

		shielding.			
6	2	Learn about Maxwell's equations. Understand the physical meaning of Maxwell's equations.	Chapter Two: Motion of a Single Charged Particle, Introduction, Maxwell's Equations, Motion of a Particle in Uniform Electric and Magnetic Fields, Electric Field = Zero, Constant Electric Field, Motion of a Particle in Non-Uniform Magnetic Fields, Field Slope Drift, Field Curvature Drift, Magnetic Mirrors, Motion of a Particle in Time-Varying Fields, Motion in a Time-Varying Electric Field, Motion in a Time-Varying Magnetic Field		
7	2	Study of the behavior of plasma particles under uniform magnetic fields. Study of the behavior of plasma particles under uniform magnetic fields and constant electric fields.			
8	2	Explain the concept of Larmor frequency, Larmor radius.			
9	2	Understand the behavior of plasma as a diamagnetic material. Describe the magnetic field gradient.			
10	2	Understand the behavior of plasma within non-uniform magnetic fields (variable with position and time).			
11	2	Explain the effect of electric fields on the motion of plasma particles. Explain the concept of magnetic moment.			
12	2	Explain the working principle of magnetic mirrors.			
13	2	Explain the concept of polarization drift.			
14	2	The difference between plasma as a single particle and plasma as a fluid, hydrodynamic equations			
15	2	Equation of Motion for a			
			Chapter Three: Study of Plasma as a Fluid Introduction, Equation of Motion for Fluids, Equation of Continuity, Fluid Flow		

		Fluid.	Perpendicular to a Magnetic		
16	2	Continuity Equation and Law of Conservation of Mass Fluid Flow	Field, Fluid Flow Parallel to a Magnetic Field, Magnetic Pressure, and the Contraction		
17	2	Perpendicular to a Magnetic Field	Phenomenon		
18	2	Fluid Flow Parallel to a Magnetic Field			
19	2	Magnetic Pressure			
20	2	Magnetic Contraction Phenomenon			
21	2	Industrial Plasma Examples of Industrial Plasma Low-pressure discharge, Atmospheric-pressure discharge, Radiation plasma	Chapter Four: Glow Discharge Plasma, Industrial Plasma Examples of Industrial Plasma, Low-Pressure Discharge, Atmospheric-Pressure Discharge, Radiation Plasma, Electron Flow in Evacuated Tubes, Glow Discharge Plasma Generation Mechanism, Glow Discharge Zones, Plasma Systems, Plasma Diagnostic Methods, Applications of Electric Discharge Plasma, Etching Process, Wet Chemical Etching, Dry Etching, Plasma Etching Mechanics		
22	2	Electron flow in evacuated tubes, Glow discharge plasma generation mechanics,			
23	2	Plasma systems, Plasma			

		diagnostic methods, Applications of electrical discharge plasma,			
24	2	Drilling process, Wet chemical drilling,			
25	2	Dry drilling, Plasma drilling mechanics,			
26	2	Advantages of plasma used in drilling, Glow discharge zones,			
27	2	Introduction to the most important applications of plasma, plasma diode	Chapter Five: Plasma Applications Introduction, plasma diodes, energy losses in plasma diodes, plasma rocket propulsion, ion propulsion, major problems in jet propulsion engines, conventional displays, plasma displays, their advantages and disadvantages, industrial applications of plasma, plasma and the environment.		
28	2	Energy losses in plasma diode, plasma rocket propulsion	Chapter Five: Plasma Applications Introduction, plasma diodes, energy losses in plasma diodes, plasma rocket propulsion, ion propulsion, major problems in jet propulsion engines, conventional displays, plasma displays, their advantages and disadvantages, industrial applications of plasma, plasma and the environment.		
29	2	Ion propulsion, major problems in jet propulsion			

		engines Conventional displays,			
30	2	plasma displays, their advantages and disadvantages, industrial applications of plasma, plasma and the environment			
11. Course Evaluation					
1. Conduct classroom discussions 2. Answer questions 3. Take quick tests to assess students' level					
12. Learning and Teaching Resources					
Required textbooks					
Main references			Francis F.Chen,” Introduction to plasma physics”, Plenum Press, 1995.		
Recommended books and references (scientific journals, reports...)			1. Dr. Asim Abdul Karim Azouz, "Introduction to Plasma Physics," University of Mosul, 1991. 2. Dr. Baha Hussein Saleh, "Fundamentals of Plasma Physics," Al-Qayadi Edition, 2009. 3. Dr. Walid Mustafa Sahioni, "Introduction to Plasma Physics," Dar Al-Fikr Al-Mu'aser, 2006.		
Electronic References, Websites			1. http://www.alkoon.alnomrosi.net 2. https://ar.wikipedia.org 3.		

	http://www.hazemsakeek.net
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Curricula and Teaching Methods, third Year / Morning and Evening Studies

1. Course Name:					
Curricula and Teaching Methods					
2. Course Code:					
50901308					
3. Semester / Year:					
Annual/2024					
4. Description Preparation Date:					
25/09/2023					
5. Available Attendance Forms: Bachelor					
6. Number of Credit Hours (Total) / Number of Units (Total)					
2					
7. Course administrator's name (mention all, if more than one name)					
Prof. Dr. Huda Kareem Hassan					
Asst. Lecturer Laith Sabah Rashid					
8. Course Objectives					
- Providing students with a comprehensive understanding of curricula and teaching methods. - Developing skills in formulating educational objectives and effectively organizing instructional content. - Enhancing scientific thinking skills and applying them in teaching. - Improving students' abilities to plan and implement lessons effectively. - Introducing students to the importance of assessment in the educational process and equipping them with innovative methods for evaluating performance.					
9. Teaching and Learning Strategies					
Strategy	1. Lecture–Discussion Method 2. Questioning Technique 3. Brainstorming 4. Relating Subject Matter to Real Life 5. Planning Questioning Strategies 6. Cooperative Learning 7. Problem Solving 8. Self-Questioning Strategy 9. Kagan Model				
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	After studying the topics assigned for the	Chapter One: Science	Lecture Method and Discussion	*Daily Oral and Written Exams*Report

		first chapter of the course, the student will be able to: Explain each of the following concepts: - Components and characteristics of science	and Knowledge	,Interrogation ,Brainstorming, Linking the Material to Reality, Developing a ,Questioning Plan ,Cooperative Learning, Problem Solving	on the Subject*Monthly Periodic Exams*Daily Assignments
2	2	After studying the topics assigned for the first chapter of the course, the student will be able to: Explain each of the following concepts: • Scientific thinking skills Philosophy of science teaching	Chapter One: Science and Knowledge	Lecture Method and Discussion ,Interrogation ,Brainstorming, Linking the Material to Reality, Developing a ,Questioning Plan ,Cooperative Learning, Problem Solving	*Daily Oral and Written Exams*Report on the Subject*Monthly Periodic Exams*Daily Assignments
3	2	After studying the topics assigned for the second chapter of the course, the student will be able to: Explain each of the following concepts: • Curriculum science • The traditional concept of curriculum	Chapter Two: Curriculum Studies	Lecture Method and Discussion ,Interrogation ,Brainstorming, Linking the Material to Reality, Developing a ,Questioning Plan ,Cooperative Learning, Problem Solving	*Daily Oral and Written Exams*Report on the Subject*Monthly Periodic Exams*Daily Assignments
4	2	After studying the topics assigned for the second chapter of the course, the student will be able to: Explain each of	Chapter Two: Curriculum Studies	Lecture Method and Discussion ,Interrogation ,Brainstorming, Linking the Material to Reality,	*Daily Oral and Written Exams*Report on the Subject*Monthly Periodic

		the following concepts: • The modern concept of curriculum • Differences between the modern and traditional concepts of curriculum		Developing a ,Questioning Plan ,Cooperative Learning, Problem Solving	Exams*Daily Assignments
5	2	After studying the topics assigned for the second chapter of the course, the student will be able to: Explain each of the following concepts: • Foundations of curriculum development • Cognitive foundation • Psychological foundation	Chapter Two: Curriculum Studies	Lecture Method and Discussion ,Interrogation ,Brainstorming, Linking the Material to Reality, Developing a ,Questioning Plan ,Cooperative Learning, Problem Solving	*Daily Oral and Written Exams*Report on the Subject*Monthly Periodic Exams*Daily Assignments
6	2	After studying the topics assigned for the second chapter of the course, the student will be able to: Explain each of the following concepts: • Social and cultural foundation • Philosophical foundation	Chapter Two: Curriculum Studies	Lecture Method and Discussion ,Interrogation ,Brainstorming, Linking the Material to Reality, Developing a ,Questioning Plan ,Cooperative Learning, Problem Solving	*Daily Oral and Written Exams*Report on the Subject*Monthly Periodic Exams*Daily Assignments
7	2	After studying the topics assigned for the first chapter of the course, the student will be able to: Explain	Chapter Two: Curriculum Studies	Lecture Method and Discussion ,Interrogation ,Brainstorming, Linking the Material to	*Daily Oral and Written Exams*Report on the Subject*Monthly Periodic

		each of the following concepts: • Curriculum organization • Criteria for organizing curriculum content		Reality, Developing a ,Questioning Plan ,Cooperative Learning, Problem Solving	Exams*Daily Assignments
8	2	After studying the topics assigned for the second chapter of the course, the student will be able to: Explain each of the following concepts: • Types of curricula • Subject-centered curriculum	Chapter Two: Curriculum Studies	Lecture Method and Discussion ,Interrogation ,Brainstorming, Linking the Material to Reality, Developing a ,Questioning Plan ,Cooperative Learning, Problem Solving	*Daily Oral and Written Exams*Report on the Subject*Monthly Periodic Exams*Daily Assignments
9	2	After studying the topics assigned for the third chapter of the course, the student will be able to: <i>Explain each of the following concepts:</i> • Challenges of Scientific Research • Criteria for Designing Scientific Research	Chapter Two: Curriculum Studies	Lecture Method and Discussion ,Interrogation ,Brainstorming, Linking the Material to Reality, Developing a ,Questioning Plan ,Cooperative Learning, Problem Solving	*Daily Oral and Written Exams*Report on the Subject*Monthly Periodic Exams*Daily Assignments
10	2	After studying the topics	Chapter Two:	Lecture Method and	*Daily Oral and Written

		assigned for the second chapter of the course, the student will be able to: Explain the following concept: • Activity-based curriculum	Curriculum Studies	Discussion ,Interrogation ,Brainstorming, Linking the Material to Reality, Developing a ,Questioning Plan ,Cooperative Learning, Problem Solving	Exams*Report on the Subject*Monthly Periodic Exams*Daily Assignments
11	2	after studying the topics assigned for the second chapter of the course, the student will be able to: Explain the following concept: • Core curriculum	Chapter Two: Curriculum Studies	Lecture Method and Discussion ,Interrogation ,Brainstorming, Linking the Material to Reality, Developing a ,Questioning Plan ,Cooperative Learning, Problem Solving	*Daily Oral and Written Exams*Report on the Subject*Monthly Periodic Exams*Daily Assignments
12	2	After studying the topics assigned for the third chapter of the course, the student will be able to: Explain each of the following concepts: • Educational and instructional objectives • Characteristics of educational objectives	Chapter Three: Educational and Instructional Objectives	Lecture Method and Discussion ,Interrogation ,Brainstorming, Linking the Material to Reality, Developing a ,Questioning Plan ,Cooperative Learning, Problem Solving	*Daily Oral and Written Exams*Report on the Subject*Monthly Periodic Exams*Daily Assignments
13	2	After studying the topics assigned for the third chapter of the course, the student will be	Chapter Three: Educational and	Lecture Method and Discussion ,Interrogation ,Brainstorming, Linking the	*Daily Oral and Written Exams*Report on the Subject*Monthly Periodic

		able to: Explain each of the following concepts: • Sources of deriving educational objectives • Levels of educational objectives	Instructional Objectives	Material to Reality, Developing a ,Questioning Plan ,Cooperative Learning, Problem Solving	Exams*Daily Assignments
14	2	After studying the topics assigned for the third chapter of the course, the student will be able to: Explain each of the following concepts: • Importance of formulating teaching objectives behaviorally • Conditions for formulating behavioral objectives	Chapter Three: Educational and Instructional Objectives	Lecture Method and Discussion ,Interrogation ,Brainstorming, Linking the Material to Reality, Developing a ,Questioning Plan ,Cooperative Learning, Problem Solving	*Daily Oral and Written Exams*Report on the Subject*Monthly Periodic Exams*Daily Assignments
15	2	After studying the topics assigned for the third chapter of the course, the student will be able to: Explain each of the following concepts: • Domains of behavioral educational objectives	Chapter Three: Educational and Instructional Objectives	Lecture Method and Discussion ,Interrogation ,Brainstorming, Linking the Material to Reality, Developing a ,Questioning Plan ,Cooperative Learning, Problem Solving	*Daily Oral and Written Exams*Report on the Subject*Monthly Periodic Exams*Daily Assignments

16	2	After studying the topics assigned for the third chapter of the course, the student will be able to: Explain each of the following concepts: • Content and learning experiences • Steps in the process of content selection	Chapter Three: Educational and Instructional Objectives	Lecture Method and Discussion ,Interrogation ,Brainstorming, Linking the Material to Reality, Developing a ,Questioning Plan ,Cooperative Learning, Problem Solving	*Daily Oral and Written Exams*Report on the Subject*Monthly Periodic Exams*Daily Assignments
17	2	After studying the topics assigned for the third chapter of the course, the student will be able to: Explain each of the following concepts: • Criteria for content selection • Content organization • Criteria for content organization	Chapter Three: Educational and Instructional Objectives	Lecture Method and Discussion ,Interrogation ,Brainstorming, Linking the Material to Reality, Developing a ,Questioning Plan ,Cooperative Learning, Problem Solving	*Daily Oral and Written Exams*Report on the Subject*Monthly Periodic Exams*Daily Assignments
18	2	After studying the topics assigned for the fourth chapter of the course, the student will be able to: Explain each of the following concepts: • Introduction to teaching methods • Teaching skills • Teaching	Chapter Four: Introduction to Teaching Methods	Lecture Method and Discussion ,Interrogation ,Brainstorming, Linking the Material to Reality, Developing a ,Questioning Plan ,Cooperative Learning, Problem Solving	*Daily Oral and Written Exams*Report on the Subject*Monthly Periodic Exams*Daily Assignments

		method • Teaching strategy • Characteristics of successful teaching			
19	2	After studying the topics assigned for the fourth chapter of the course, the student will be able to: Explain each of the following concepts: • Types of teaching methods • Teaching methods related to cognitive theory • Lecture method	Chapter Four: Introduction to Teaching Methods	Lecture Method and Discussion ,Interrogation ,Brainstorming, Linking the Material to Reality, Developing a ,Questioning Plan ,Cooperative Learning, Problem Solving	*Daily Oral and Written Exams*Report on the Subject*Monthly Periodic Exams*Daily Assignments
20	2	After studying the topics assigned for the fourth chapter of the course, the student will be able to: Explain each of the following concepts: • Discussion method • Guided discussion method	Chapter Four: Introduction to Teaching Methods	Lecture Method and Discussion ,Interrogation ,Brainstorming, Linking the Material to Reality, Developing a ,Questioning Plan ,Cooperative Learning, Problem Solving	*Daily Oral and Written Exams*Report on the Subject*Monthly Periodic Exams*Daily Assignments
21	2	After studying the topics assigned for the fourth chapter of	Chapter Four: Introduction	Lecture Method and Discussion ,Interrogation	*Daily Oral and Written Exams*Report on the

		the course, the student will be able to: Explain each of the following concepts: • Storytelling method • Problem-solving method	to Teaching Methods	,Brainstorming, Linking the Material to Reality, Developing a ,Questioning Plan ,Cooperative Learning, Problem Solving	Subject*Monthly Periodic Exams*Daily Assignments
22	2	After studying the topics assigned for the fourth chapter of the course, the student will be able to: Explain each of the following concepts: • Teaching methods related to behavioral theories • Blended learning	Chapter Four: Introduction to Teaching Methods	Lecture Method and Discussion ,Interrogation ,Brainstorming, Linking the Material to Reality, Developing a ,Questioning Plan ,Cooperative Learning, Problem Solving	*Daily Oral and Written Exams*Report on the Subject*Monthly Periodic Exams*Daily Assignments
23	2	After studying the topics assigned for the fourth chapter of the course, the student will be able to: Explain each of the following concepts: • Teaching methods related to social theories • Cooperative learning	Chapter Four: Introduction to Teaching Methods	Lecture Method and Discussion ,Interrogation ,Brainstorming, Linking the Material to Reality, Developing a ,Questioning Plan ,Cooperative Learning, Problem Solving	*Daily Oral and Written Exams*Report on the Subject*Monthly Periodic Exams*Daily Assignments
24	2	After studying the topics assigned for the	Chapter Four: Introduction	Lecture Method and Discussion	*Daily Oral and Written Exams*Report

		fourth chapter of the course, the student will be able to: Explain each of the following concepts: • Other teaching methods • Field visits • Report writing	to Teaching Methods	,Interrogation ,Brainstorming, Linking the Material to Reality, Developing a ,Questioning Plan ,Cooperative Learning, Problem Solving	on the Subject*Monthly Periodic Exams*Daily Assignments
25	2	After studying the topics assigned for the fifth chapter of the course, the student will be able to: Explain each of the following concepts: • The origin of laboratory work • Types of laboratories in terms of performance and implementation • Practical performance	Chapter Five: Laboratory and Practical Performance	Lecture Method and Discussion ,Interrogation ,Brainstorming, Linking the Material to Reality, Developing a ,Questioning Plan ,Cooperative Learning, Problem Solving	*Daily Oral and Written Exams*Report on the Subject*Monthly Periodic Exams*Daily Assignments
26	2	After studying the topics assigned for the sixth chapter of the course, the student will be able to: Explain each of the following concepts: • Assessment and its types	Chapter Six: Assessment	Lecture Method and Discussion ,Interrogation ,Brainstorming, Linking the Material to Reality, Developing a ,Questioning Plan ,Cooperative Learning, Problem Solving	*Daily Oral and Written Exams*Report on the Subject*Monthly Periodic Exams*Daily Assignments

27	2	After studying the topics assigned for the seventh chapter of the course, the student will be able to: Explain each of the following concepts: • The concept of planning • The importance of planning for teaching	Chapter Seven: Planning in Teaching	Lecture Method and Discussion ,Interrogation ,Brainstorming, Linking the Material to Reality, Developing a ,Questioning Plan ,Cooperative Learning, Problem Solving	*Daily Oral and Written Exams*Report on the Subject*Monthly Periodic Exams*Daily Assignments
28	2	After studying the topics assigned for the seventh chapter of the course, the student will be able to: Explain each of the following concepts: • Principles of academic planning • Types of planning	Chapter Seven: Planning in Teaching	Lecture Method and Discussion ,Interrogation ,Brainstorming, Linking the Material to Reality, Developing a ,Questioning Plan ,Cooperative Learning, Problem Solving	*Daily Oral and Written Exams*Report on the Subject*Monthly Periodic Exams*Daily Assignments
29	2	After studying the topics assigned for the seventh chapter of the course, the student will be able to: Explain each of the following concepts: • Characteristics of a good lesson plan • Qualities of successful daily	Chapter Seven: Planning in Teaching	Lecture Method and Discussion ,Interrogation ,Brainstorming, Linking the Material to Reality, Developing a ,Questioning Plan ,Cooperative Learning, Problem Solving	*Daily Oral and Written Exams*Report on the Subject*Monthly Periodic Exams*Daily Assignments

		lesson preparation			
30	2	After studying the topics assigned for the seventh chapter of the course, the student will be able to: Explain each of the following concepts: • Main elements of the daily lesson plan	Chapter Seven: Planning in Teaching	Lecture Method and Discussion ,Interrogation ,Brainstorming, Linking the Material to Reality, Developing a ,Questioning Plan ,Cooperative Learning, Problem Solving	*Daily Oral and Written Exams*Report on the Subject*Monthly Periodic Exams*Daily Assignments
11.Course Evaluation					
1. Written Tests 2. Practical Assessment 3. Projects and Reports 4. Continuous Assessment 5. Self-Assessment					
12.Learning and Teaching Resources					
Required textbooks			Book: Curriculum and Teaching Methods Authors: Dr. Huda Kareem Hassan and Dr. Nagham Hadi Al-Binaa Year: 2018		
Main references			☐ Teaching Methods and Techniques: Dr. Rabit Masoud, 2017. ☐ Active Learning: Aqeel Mahmoud Rifai, Al-Furat Publishing House, 2014. ☐ General Teaching Methods: Dr. Tawfiq Ahmed Mar'i and Mohammad Mahmoud Al-Hila, Amman, 2006.		
Recommended books and references (scientific journals, reports...)			<i>Al-Mustansiriya Journal of Humanities</i>		
Electronic References, Websites			<i>The Academic Profile and Classroom</i>		

Course Description Form/Nuclear Physics - Fourth Stage

1. Course Name:
Nuclear Physics
2. Course Code:
509080401
3. Semester / Year:
Annual/2024
4. Description Preparation Date:
30/10/2024
5. Available Attendance Forms: Bachelor
in-person/Weekly
6. Number of Credit Hours (Total) / Number of Units (Total)
Number of hours: 72 hours / Number of units: 8
7. Course administrator's name (mention all, if more than one name)
1 – Asst. Prof. Dr. Athraa Naji Jameel 2– Asst. Prof. Dr. Firas Hashem Ahmed
8. Course Objectives
1 -Understanding nuclear structure: Introduce the student to the components of the nucleus and their properties such as mass number and charge, and nuclear structure models (shell model, liquid drop model). 2 -Nuclear Reactions: Explain the types of nuclear reactions such as fission and fusion, and explain their mechanics. 3 -Radioactivity: Explain the phenomena of natural and artificial radioactivity, types of radiation (alpha, beta, gamma), and the laws of radioactive decay. 4 -Nuclear Applications: Highlighting the peaceful uses of nuclear energy in the fields of medicine, industry, and agriculture.

5 -Nuclear Energy: Calculation of nuclear binding energy and energy released from nuclear reactions using Einstein's equation and nuclear mass data.

6 -Nuclear Techniques: Identify the devices and tools used in measuring and detecting radiation, such as the Kaiser detector and pulse counter.

7 -Radiation Protection: Educating students on the principles of radiation protection and the basics of radiation safety.

8 -Developing research skills: Encourage students to analyse scientific articles and make presentations or small projects on selected topics in nuclear physics.

9. Teaching and Learning Strategies

1 -Interactive Lectures

- Use theoretical explanations supported by mathematical examples and illustrations.
- Encourage discussion and questions in class to stimulate critical thinking.

2 -Problem–Based Learning (PBL)

- Presenting real nuclear issues and challenges that require students to analyse them and provide logical solutions using physics equations.

3 -Individual/group presentations and projects

- Assign students to prepare presentations on selected topics (e.g. fission, nuclear reactors, medical applications).
- Develop scientific research and presentation skills.

4 -Technology–based learning

- Using educational videos, interactive simulations, and specialised nuclear modelling software such as GEANT4 or Nuclide Charts.

5 -Laboratory work

-Conduct experiments to measure radioactivity, analyse radiation spectra, or calibrate reagents.

-Enhance the practical aspect associated with the theoretical material.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	The student can: - Identify nuclear mass - Identify nuclear charge - Explain nuclear volume - nucleus	Chapter 1: Basic Concepts Nuclear Mass Nuclear Charge Nuclear Volume	Daily, oral and written exams (on the board and paper) -Solving the questions of each chapter on the board -Periodic monthly exams	-Smart board - Discussion - Linking the material to reality - Developing a plan for asking questions, setting questions and giving daily quick tests
2	3	-Identify the charge distribution in the nucleus	Charge Distribution in the Nucleus Dynamic Properties of the Nucleus Definition of Basic Terms	Daily, oral and written exams (on the board and paper) -Solving the questions of each chapter on the board -Periodic monthly exams	-Smart board - Discussion - Linking the material to reality - Developing a plan for asking questions, setting questions and giving daily quick tests
3	3	The student will be able to: Terminology related to the nuclear	Multiple Choice Problems Chapter 2: Nuclear Structure Nuclear Binding Energy Rate Binding Energy	Daily, oral and written exams (on the board and paper) -Solving the questions of each chapter on the board -Periodic monthly exams	-Smart board - Discussion - Linking the material to reality - Developing a plan for asking questions, setting questions and giving daily quick tests
4	3	he student will be able to: Understand the concepts of nuclear structure of the nucleus	Separation Energy Line of Stability and Abundance Multiple Choice Problems	Daily, oral and written exams (on the board and paper) -Solving the questions of each	-Smart board - Discussion - Linking the material to reality - Developing a plan for asking questions, setting

		Understand the average binding energy and dissociation energy		chapter on the board -Periodic monthly exams	questions and giving daily quick tests
5	3	Understand the liquid drop model and the semi-empirical equation for mass	Chapter 3: Nuclear Models Nuclear Forces Nuclear Models	Daily, oral and written exams (on the board and paper) -Solving the questions of each chapter on the board -Periodic monthly exams	-Smart board - Discussion - Linking the material to reality - Developing a plan for asking questions, setting questions and giving daily quick tests
6	3	- Understand the intrinsic angular momentum of the nucleus	Liquid Drop Model and Semi-Empirical Equation for Mass Magnetic Moment of the Nucleus Intrinsic Angular Momentum of the Nucleus	Daily, oral and written exams (on the board and paper) -Solving the questions of each chapter on the board -Periodic monthly exams	-Smart board - Discussion - Linking the material to reality - Developing a plan for asking questions, setting questions and giving daily quick tests
7	3	the shell model Chapter problems	-Shell Model Chapter Problems	Daily, oral and written exams (on the board and paper) -Solving the questions of each chapter on the board -Periodic monthly exams	-Smart board - Discussion - Linking the material to reality - Developing a plan for asking questions, setting questions and giving daily quick tests
8	3	The student will be able to: - Understand radioactive decay - Understand the laws of radioactive decay	Chapter 4: Radioactive Decay	Daily, oral and written exams (on the board and paper) -Solving the questions of each chapter on the board -Periodic monthly exams	-Smart board - Discussion - Linking the material to reality - Developing a plan for asking questions, setting questions and giving daily quick tests

9	3	The student will be able to: Understand radioactivity - Understand half-life	Laws of Radioactive Decay Radioactivity	Daily, oral and written exams (on the board and paper) -Solving the questions of each chapter on the board -Periodic monthly exams	-Smart board - Discussion - Linking the material to reality - Developing a plan for asking questions, setting questions and giving daily quick tests
10	3	The student can: - Know half-life and solve problems	Half-Life Decomposition Constant Multiple Choice Problems	Daily, oral and written exams (on the board and paper) -Solving the 3 questions of each chapter on the board -Periodic monthly exams	-Smart board - Discussion - Linking the material to reality - Developing a plan for asking questions, setting questions and giving daily quick tests
11	3	- Distinguish between alpha and beta decays	Alpha Decay Beta Decay	Daily, oral and written exams (on the board and paper) -Solving the questions of each chapter on the board -Periodic monthly exams	-Smart board - Discussion - Linking the material to reality - Developing a plan for asking questions, setting questions and giving daily quick tests
12	3	-Distinguish between spectra (beta and alpha)	Beta Particle Spectrum Neutrino Hypothesis Gamma Decay Chapter	Daily, oral and written exams (on the board and paper) -Solving the questions of each chapter on the board -Periodic monthly exams	-Smart board - Discussion - Linking the material to reality - Developing a plan for asking questions, setting questions and giving daily quick tests
13	3	- Know gamma decays - Solve questions related to the above concepts	Gamma Decay Energy	Daily, oral and written exams (on the board and paper) -Solving the questions of each	-Smart board - Discussion - Linking the material to reality - Developing a plan for asking questions, setting

				chapter on the board -Periodic monthly exams	questions and giving daily quick tests
14	3	The student can: - Understand stopping power. - Learn the interaction of gamma rays with matter. - Learn the interaction of neutrons with matter. - Learn scattering and absorption reactions.	Problems Chapter 5: Nuclear Reaction Energy Law of Conservation of Energy	Daily, oral and written exams (on the board and paper(-Solving the questions of each chapter on the board -Periodic monthly exams	-Smart board - Discussion - Linking the material to reality - Developing a plan for asking questions, setting 3 questions and giving daily quick tests
15	3	- Learn the interaction of protons with matter -Learn the interaction of deuterons with matter.	Scattering and absorption. - Interaction of protons with matter - Threshold energy	Daily, oral and written exams (on the board and paper(-Solving the questions of each chapter on the board -Periodic monthly exams	-Smart board - Discussion - Linking the material to reality - Developing a plan for asking questions, setting questions and giving daily quick tests
16	3	- - The interaction cross section. - Solve a set of questions	Law of conservation of momentum	Daily, oral and written exams (on the board and paper(-Solving the questions of each chapter on the board -Periodic monthly exams	-Smart board - Discussion - Linking the material to reality - Developing a plan for asking questions, setting questions and giving daily quick tests
17	3	To learn the laws of conservation of momentum and how to apply them. The student can: - Nuclear fission:	- Target mass	Daily, oral and written exams (on the board and paper(-Solving the questions of each chapter on the board -Periodic monthly exams	-Smart board - Discussion - Linking the material to reality - Developing a plan for asking questions, setting questions and giving daily quick tests

18	3	- Identify the energy of a nuclear reaction.	Chapter Six: Nuclear Reaction Energy	Daily, oral and written exams (on the board and paper) -Solving the questions of each chapter on the board -Periodic monthly exams	-Smart board - Discussion - Linking the material to reality - Developing a plan for asking questions, setting questions and giving daily quick tests
19		- Calculate the energy released by nuclear fission - Energy released by fission.	- Nuclear Fission - Energy Released from Fission - Bohr-Wheeler Theory of Fission - Nuclear Fusion	Daily, oral and written exams (on the board and paper) -Solving the questions of each chapter on the board -Periodic monthly exams	-Smart board - Discussion - Linking the material to reality - Developing a plan for asking questions, setting questions and giving daily quick tests
20	3	- Identify nuclear fusion: - The threshold for a reaction. - Solve a set of questions. - Identify nuclear accelerators. - Identify the types of linear accelerators. - Identify circular accelerators.	Uranium Isotopes Nuclear Accelerators Types of Accelerators (Linear, Circular, etc.)	Daily, oral and written exams (on the board and paper) -Solving the questions of each chapter on the board -Periodic monthly exams	-Smart board - Discussion - Linking the material to reality - Developing a plan for asking questions, setting questions and giving daily quick tests

Practical application period (6 weeks)

21		- The student can Identify elementary particles and their types Identify elementary particles and their types.	Chapter Six: Elementary Particles Fundamental Forces Types of Elementary Particles Hadrons	Daily, oral and written exams (on the board and paper) -Solving the questions of each chapter on the board -Periodic monthly exams	-Smart board - Discussion - Linking the material to reality - Developing a plan for asking questions, setting questions and giving daily quick tests
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22	3	The student can: - Identify leptons and quarks. - Identify the dangers of radioactive sources. - Identify symmetry and charge	Symmetry Charge Problems Multiple Choice	Daily, oral and written exams (on the board and paper) -Solving the questions of each chapter on the board -Periodic monthly exams	-Smart board - Discussion - Linking the material to reality - Developing a plan for asking questions, setting questions and giving daily quick tests
23	3	- Identify radiation doses - radiation protection methods.	Chapter 9: Units of Exposure Radiation Flux Density Units of Measurement of Radiation Exposure - Exposure - Absorbed Dose	Daily, oral and written exams (on the board and paper) -Solving the questions of each chapter on the board -Periodic monthly exams	-Smart board - Discussion - Linking the material to reality - Developing a plan for asking questions, setting questions and giving daily quick tests
24	3	- The student should know radiation doses. - Understand the dangers of radioactive sources	- Equivalent Dose Basic Principles of Handling Radioactive Materials - Radiation Flux Density - Biological Effects of Radiation	Daily, oral and written exams (on the board and paper) -Solving the questions of each chapter on the board -Periodic monthly exams	-Smart board - Discussion - Linking the material to reality - Developing a plan for asking questions, setting questions and giving daily quick tests

11. Course Evaluation

Type of assessment	Type of assessment
1– 4 quarterly exams (2 exams per semester)	%24
2– Assignments, reports, attendance and class participation	%4
3– Annual lab (practical)	%12
4– Final lab (practical)	%18
5– Theoretical final exam	%42

12. Learning and Teaching Resources

Required textbooks	Principles of Nuclear Physics / by Meyerhof / translated by Dr. Asim Abdul Karim / University of Mosul / (1982)
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Main references	1- Nuclear Physics / Dr. Munib Adel Khalil / University of Mosul / 1994 2- Modern Physics, by Arthur Biezer 3- Nuclear Physics by Barcham
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	.1MIT OpenCourseWare – Nuclear Physics :الرابط https://ocw.mit.edu .2IAEA – International Atomic Energy Agency :الرابط https://www.iaea.org .3 HyperPhysics – Nuclear Physics :الرابط http://hyperphysics.phy-astr.gsu.edu .4CERN – European Organization for Nuclear Research :الرابط https://home.cern .5Nuclear Data Services – NNDC (Brookhaven National Laboratory) :الرابط https://www.nndc.bnl.gov .6Coursera / edX – Nuclear Physics Courses Coursera: https://www.coursera.org edX: https://www.edx.org

Course Description Form

1. Course Name and Stage:					
Solid State Physics - Stage 4 (Morning, Evening)					
2. Course Code:					
509080402					
3. Term / Year :					
Sinnoi Annual 2024-2025					
4. Date of preparation of this description:					
4/10/2024					
5. Available Attendance Forms: Attendance/ Weekly					
Attendance/ Weekly					
6. Number of study hours (total)/number of units (total): 90 hours /number of units 180					
Number of Hours 90 Hours /Number of Units 180					
7. Name of course administrator (if more than one name is mentioned)					
Prof. Dr.Ali Ahmed Yousif			Prof. Dr. Salam Amir Youssef		
8. Course Objectives					
Studying the crystal structure and the linking forces between the atom, the crystal state, the crystal networks, the basic vectors and the cell unit, the crystal structure (three-dimensional), the levels of crystal structure and the Miller coefficients, the forces between the atoms in the crystal structure, the coefficient of stacking and the diffraction of the crystal, as well as the vibration of the lattice and the models of explaining the vibration of the lattice and the classical theory of free electrons and the dynamics of the movement of electrons and the effective mass. Solid-state physics also aims to study the crystal defects of all kinds, the phenomenon of excessive conduction and the depth of penetration					
9. Teaching and Learning Strategies					
Develop a plan to ask questions and put questions and ask daily rapid exams in addition to monthly exams and also prepare Homework and reporting					
10. Course Structure					
Week	Hours	Intended Learning Outcomes	Unit or Topic Name	Learning Method	Method of Evaluation
1	3	The student's ability to understand the crystal structure of solids.	Crystalline state - amorphous state - cell unit	- Using smart whiteboard power point - Linking the material to reality -Simple explanatory means - Develop a plan to ask questions, develop	- Daily, oral and written exams (blackboard and paper) - Preparing reports on some topics - Periodic monthly exams

				questions, and ask daily rapid exams	
2	3	Student's ability to understand the crystal structure of solids	Pravisan lattice - non-Pravisan lattice - types of lattice	- Using smart whiteboard power point - Linking the material to reality - Simple explanatory means - Develop a plan to ask questions, develop questions, and ask daily rapid exams	- Daily, oral and written exams (blackboard and paper) - Preparing reports on some topics - Periodic monthly exams
3	3	Student's ability to understand the crystal structure of solids	Simple cube - body centered cube	- Using smart whiteboard power point - Linking the material to reality - Simple explanatory means - Develop a plan to ask questions, develop questions, and ask daily rapid exams	- Daily, oral and written exams (blackboard and paper) - Preparing reports on some topics - Periodic monthly exams
4	3	Student's ability to understand the crystal structure of solids	Centralized Cube - Sodium Chloride	- Using smart whiteboard power point - Linking the material to reality - Simple explanatory means - Develop a plan to ask questions, develop questions, and ask daily rapid	- Daily, oral and written exams (blackboard and paper) - Preparing reports on some topics - Periodic monthly exams

				exams	
5	3	Student's ability to understand the crystal structure of solids	Composition of Hexagonal Conjugate Stacking - Miller's Modulus	- Using smart whiteboard power point - Linking the material to reality - Simple explanatory means - Develop a plan to ask questions, develop questions, and ask daily rapid exams	- Daily, oral and written exams (blackboard and paper) - Preparing reports on some topics - Periodic monthly exams
6.	3	Student's ability to understand diffraction in crystals	Diffraction in Crystals - Fallen Beams	- Using smart whiteboard power point - Linking the material to reality - Simple explanatory means - Develop a plan to ask questions, develop questions, and ask daily rapid exams	- Daily, oral and written exams (blackboard and paper) - Preparing reports on some topics - Periodic monthly exams
7	3	Student's ability to understand diffraction in crystals	Braque's Law X-Ray	- Using smart whiteboard power point - Linking the material to reality - Simple explanatory means - Develop a plan to ask questions, develop questions, and ask daily rapid exams	- Daily, oral and written exams (blackboard and paper) - Preparing reports on some topics - Periodic monthly exams
8	3	Student's ability	Neutrons - Electrons	- Using smart	- Daily, oral and

		to understand diffraction in crystals		whiteboard power point - Linking the material to reality -Simple explanatory means - Develop a plan to ask questions, develop questions, and ask daily rapid exams	written exams (blackboard and paper) - Preparing reports on some topics - Periodic monthly exams
9	3	Student's ability to understand diffraction in crystals	Experimental Methods of Diffraction - Laotian Method	- Using smart whiteboard power point - Linking the material to reality -Simple explanatory means - Develop a plan to ask questions, develop questions, and ask daily rapid exams	- Daily, oral and written exams (blackboard and paper) - Preparing reports on some topics - Periodic monthly exams
10	3	Student's ability to understand diffraction in crystals	Rotary Crystallization Method - Powder Method	- Using smart whiteboard power point - Linking the material to reality -Simple explanatory means - Develop a plan to ask questions, develop questions, and ask daily rapid exams	- Daily, oral and written exams (blackboard and paper) - Preparing reports on some topics - Periodic monthly exams
11	3	Student's ability to understand diffraction in	Inverted Grid - Installer	- Using smart whiteboard power point	- Daily, oral and written exams (blackboard and

		crystals		- Linking the material to reality - Simple explanatory means - Develop a plan to ask questions, develop questions, and ask daily rapid exams	paper) - Preparing reports on some topics - Periodic monthly exams
12	3	The student's ability to absorb the vibration of the types of young people	Grille Vibration - Vibration of a one-atom grille in one dimension	- Using smart whiteboard power point - Linking the material to reality - Simple explanatory means - Develop a plan to ask questions, develop questions, and ask daily rapid exams	- Daily, oral and written exams (blackboard and paper) - Preparing reports on some topics - Periodic monthly exams
13	3	The student's ability to absorb the vibration of the types of young people	Vibration of the two-atom lattice in one dimension - specific heat of the lattice	- Using smart whiteboard power point - Linking the material to reality - Simple explanatory means - Develop a plan to ask questions, develop questions, and ask daily rapid exams	- Daily, oral and written exams (blackboard and paper) - Preparing reports on some topics - Periodic monthly exams
14	3	The student's ability to absorb the vibration of the types of young people	Fermi Energy - Density of Electronic Specific Cases	- Using smart whiteboard power point - Linking the material to	- Daily, oral and written exams (blackboard and paper) - Preparing reports

				reality -Simple explanatory means - Develop a plan to ask questions, develop questions, and ask daily rapid exams	on some topics - Periodic monthly exams
15	3	Understand the classical models and theories that explained free electrons	Free electrons - the origin of the energy gap	- Using smart whiteboard power point - Linking the material to reality -Simple explanatory means - Develop a plan to ask questions, develop questions, and ask daily rapid exams	- Daily, oral and written exams (blackboard and paper) - Preparing reports on some topics - Periodic monthly exams
16	3	Understand the classical models and theories that explained free electrons	Bloch function - effective mass	- Using smart whiteboard power point - Linking the material to reality -Simple explanatory means - Develop a plan to ask questions, develop questions, and ask daily rapid exams	- Daily, oral and written exams (blackboard and paper) - Preparing reports on some topics - Periodic monthly exams
17	3	Understand the classical models and theories that explained free electrons	Hall's Lighting - Metals	- Using smart whiteboard power point - Linking the material to reality -Simple	- Daily, oral and written exams (blackboard and paper) - Preparing reports on some topics - Periodic monthly

				explanatory means - Develop a plan to ask questions, develop questions, and ask daily rapid exams	exams
18	3	Understand the classical models and theories that explained free electrons	Insulators-Semiconductors	- Using smart whiteboard power point - Linking the material to reality -Simple explanatory means - Develop a plan to ask questions, develop questions, and ask daily rapid exams	- Daily, oral and written exams (blackboard and paper) - Preparing reports on some topics - Periodic monthly exams
19	3	Understand the classical models and theories that explained free electrons	Effective Mass - Point Defects	- Using smart whiteboard power point - Linking the material to reality -Simple explanatory means - Develop a plan to ask questions, develop questions, and ask daily rapid exams	- Daily, oral and written exams (blackboard and paper) - Preparing reports on some topics - Periodic monthly exams
20	3	Understand the classical models and theories that explained free electrons	Gaps - Schottky defects	- Using smart whiteboard power point - Linking the material to reality -Simple explanatory means	- Daily, oral and written exams (blackboard and paper) - Preparing reports on some topics - Periodic monthly exams

				- Develop a plan to ask questions, develop questions, and ask daily rapid exams	
21	3	Understand the classical models and theories that explained free electrons	Frenkel Defects - Linear Defects	- Using smart whiteboard power point - Linking the material to reality - Simple explanatory means - Develop a plan to ask questions, develop questions, and ask daily rapid exams	- Daily, oral and written exams (blackboard and paper) - Preparing reports on some topics - Periodic monthly exams
22	3	Understand the classical models and theories that explained free electrons	Barefoot dislocation - superficial defects	- Using smart whiteboard power point - Linking the material to reality - Simple explanatory means - Develop a plan to ask questions, develop questions, and ask daily rapid exams	- Daily, oral and written exams (blackboard and paper) - Preparing reports on some topics - Periodic monthly exams
23	3	Understand the classical models and theories that explained free electrons	Volumetric disadvantages - excessive conduction theory	- Using smart whiteboard power point - Linking the material to reality - Simple explanatory means - Develop a plan to ask	- Daily, oral and written exams (blackboard and paper) - Preparing reports on some topics - Periodic monthly exams

				questions, develop questions, and ask daily rapid exams	
24	3	Understand the classical models and theories that explained free electrons	Penetration depth - contact voltage/effective mass	- Using smart whiteboard power point - Linking the material to reality - Simple explanatory means - Develop a plan to ask questions, develop questions, and ask daily rapid exams	- Daily, oral and written exams (blackboard and paper) - Preparing reports on some topics - Periodic monthly exams
25	3	Understand the classical models and theories that explained free electrons	Fermi Energy - Density of Electronic Specific Cases	- Using smart whiteboard power point - Linking the material to reality - Simple explanatory means - Develop a plan to ask questions, develop questions, and ask daily rapid exams	- Daily, oral and written exams (blackboard and paper) - Preparing reports on some topics - Periodic monthly exams
26	3	The student's ability to understand the theory of the region continued the energy gap for different materials	Free electrons - the origin of the energy gap	- Using smart whiteboard power point - Linking the material to reality - Simple explanatory means - Develop a plan to ask questions, develop	- Daily, oral and written exams (blackboard and paper) - Preparing reports on some topics - Periodic monthly exams

				questions, and ask daily rapid exams	
27	3	The student's ability to understand the theory of the region continued the energy gap for different materials	Bloch function - effective mass	- Using smart whiteboard power point - Linking the material to reality - Simple explanatory means - Develop a plan to ask questions, develop questions, and ask daily rapid exams	- Daily, oral and written exams (blackboard and paper) - Preparing reports on some topics - Periodic monthly exams
28	3	The student's ability to understand the theory of the region continued the energy gap for different materials	Hall's Lighting Metals	- Using smart whiteboard power point - Linking the material to reality - Simple explanatory means - Develop a plan to ask questions, develop questions, and ask daily rapid exams	- Daily, oral and written exams (blackboard and paper) - Preparing reports on some topics - Periodic monthly exams
29	3	The student's ability to understand the theory of the region continued the energy gap for different materials	Insulators-Semiconductors	- Using smart whiteboard power point - Linking the material to reality - Simple explanatory means - Develop a plan to ask questions, develop questions, and ask daily rapid	- Daily, oral and written exams (blackboard and paper) - Preparing reports on some topics - Periodic monthly exams

				exams	
30	3	The student's ability to understand the theory of the region continued the energy gap for different materials	Effective Mass - Point Defects	- Using smart whiteboard power point - Linking the material to reality - Simple explanatory means - Develop a plan to ask questions, develop questions, and ask daily rapid exams	- Daily, oral and written exams (blackboard and paper) - Preparing reports on some topics - Periodic monthly exams
11. Evaluation of the decision					
- Daily, oral and written exams (blackboard and paper) - Preparing reports on some topics - Periodic monthly exams					
12. Learning and Teaching Resources					
Required textbooks (methodology if any)			1- Solid State Physics by Dr. Yahya Nouri Al-Jamal 2- Solid State Physics - Written by Dr. Moayad Gab Youssef		
Key References (Sources)			Solid State Physics by Dr. Yahya Nouri Al-Jamal Solid State Physics - Written by Dr. Moayad Gabriel Youssef		
Recommended supporting books and references (scientific journals, reports...)			Solid State Physics - Written by Dr. Sobhi Saeed – Dr. Shaker Jaber - Dr. Youssef Mouloud Solid Physics Dr. Abdel Fattah Ahmed Al-Shazly – Faculty of Education, Ain Shams University		
E-References , Websites			http://www.alkoon.alnomrosi.net https://ar.wikipedia.org http://www.hazemsakeek.net		

Quantum Mechanics – First Level (Morning and Evening)

1. Course Name:
Quantum Mechanics
2. Course Code:
509080403
3. Semester / Year:
Annual/2024
4. Description Preparation Date:
30/10/2024
5. Available Attendance Forms: Bachelor
In-person / Weekly
6. Number of Credit Hours (Total) / Number of Units (Total)
3 hours per week / 72 hours per year (18 hours for Application in schools)
7. Course administrator's name (mention all, if more than one name)
1 – Prof. Dr. Hassan Nouri Abd Al-Wahab 2– Asst. Prof. Dr. Ali Taher Mohi
8. Course Objectives
1.This semester aims to review the fundamental concepts previously learned by the student in earlier stages, in a way that enables them to properly understand the well-established and unquestionable procedures of classical physics when dealing with macroscopic systems. 2. To understand and interpret the fundamental principles of quantum mechanics from a theoretical perspective. 3. To apply basic equations, such as the Schrödinger equation, to various physical systems—starting with simple ones like the free particle, the free particle in a potential barrier, the free particle in a potential box, and the phenomena of

barrier tunneling and reflection. Then moving on to more realistic systems such as the harmonic oscillator and single-electron atoms.

9. Teaching and Learning Strategies

Strategy

1. Theoretical Lectures (Lectures):

- Used to present theoretical content through board explanations and illustrative diagrams.
- Concepts are introduced gradually, progressing from simple to complex.
- PowerPoint presentations are used when needed to clarify historical experiments and abstract concepts (such as the uncertainty principle, wave function, etc.).

2. Active Learning:

- Encouraging thinking and discussion through in-class questioning.
- Dividing students into small groups to solve applied problems and discuss solutions.
- Assigning student presentations on selected topics to enhance understanding and participation.

3. Problem Solving Sessions:

- Organizing weekly sessions to solve quantum mechanics exercises and problems.
- Training students to formulate solutions logically and in detail.
- Using real-life problems and linking them to applications (e.g., quantum tunneling, hydrogen atom, particle in a box).

4. Use of Educational Technology:

- Utilizing simulation programs (such as PhET Simulations) to illustrate concepts like wave functions, probability distributions, etc.
- Encouraging students to use scientific software (such as Python or MATLAB) to solve equations and analyze results.

5. Formative Assessment:

- Conducting regular short quizzes to assess concept comprehension.
- Following up on weekly assignments and discussing solutions with students.

6. Mini Projects or Presentations:

- Assigning students to prepare short presentations or research reports on advanced topics (e.g., Pauli exclusion principle, Heisenberg's matrix mechanics, spin, etc.).

		• Enhancing presentation and scientific research skills.			
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Understand the necessity of quantum mechanics and the failure of classical mechanics to explain many natural phenomena.	Chapter One: <i>Physical Foundations of Quantum Mechanics</i> – Introduction, Quantum Mechanics, The need for Q.M., Black Body Radiation	- Discussion-Blackboard-PowerPoint-Smartboard-Simple visual aids- Real-life applications	- Daily homework- Oral and written quizzes-Monthly exams-Report writing on selected topics
2	3	Understand atomic stability and the effect of photons.	<i>Atomic Stability, Photoelectric Effect, Duality of Matter and Radiation</i>	Same as above	Same as above
3	3	Apply the uncertainty principle.	<i>Uncertainty Principle, Correspondence Principle, Exercises</i>	Same as above	Same as above
4	3	Understand the motivation for using the wave function, its mathematical form, derivation of Schrödinger’s equation, operators and probability interpretation.	Chapter Two: <i>Elementary Properties of Quantum Mechanics</i> – Wave Function and Interpretation, Schrödinger Equation Derivation	Same as above	Same as above
5	3	Understand the concept of operators and their properties.	<i>Operators and Operator Equations,</i>	Same as above	Same as above

			<i>Examples</i>		
6	3	Understand eigenvalue equations and their applications.	<i>Eigenvalues and Eigenfunctions, Examples</i>	Same as above	Same as above
7	3	Understand observables in quantum mechanics and how to compute expectation values and variance.	<i>Observables, Expectation Values, Variance, Examples</i>	- Discussion- Blackboard- PowerPoint- Smartboard- Simple visual aids- Real-life applications	- Daily homework- Oral and written quizzes- Monthly exams- Report writing
8	3	Understand motion and constants of motion in quantum systems.	<i>Equation of Motion, Constants of Motion, Degeneracy, Examples</i>	Same as above	Same as above
9	3	Understand probability conservation and probability current density.	<i>Probability Conservation, Probability Current Density, Quantized States, Examples</i>	Same as above	Same as above
10	3	Understand parity and its applications.	<i>Parity, Examples, Exercises</i>	Same as above	Same as above
11	3	Understand the physical meaning of a free particle and its motion under different potentials.	Chapter Three: <i>Simplified Quantum Systems</i> – Free Particle, Schrödinger Equation in 1D, Finite and Infinite Potential Step	Same as above	Same as above
12	3	Understand particle behavior in potential wells and density of states.	<i>Particle in a Box (1D and 3D), Density of States</i>	Same as above	Same as above

13	3	Understand quantum tunneling and potential wells.	<i>Potential Barrier Penetration, Potential Well, Exercises</i>	Same as above	Same as above
14	3	Introduction to the quantum harmonic oscillator and the Hamiltonian function.	Chapter Four: <i>Simple Harmonic Oscillator – Hamiltonian Function, Schrödinger Equation Solution</i>	Same as above	Same as above
15	3	Understand the analytical treatment of the harmonic oscillator and comparison with classical results.	<i>Analytical Treatment (Energy Eigenvalues and Wavefunctions) , Part 1</i>	Same as above	Same as above
16	3	Continue the analytical treatment and introduce operator method.	<i>Operator Treatment, Comparison with Classical Theory, Exercises</i>	Same as above	Same as above
17	3	Understand quantum treatment of central potentials and one-electron atoms.	Chapter Five: <i>One-Electron Atoms – Spherically Symmetric Potential, Schrödinger Equation</i>	Same as above	Same as above
18	3	Solve Schrödinger equation using separation of variables.	<i>Separation of Variables, Part 1 & Part 2</i>	Same as above	Same as above
19–25	3 each	Apply practical	<i>Applying in school</i>		
26	3	Understand the components of wavefunctions for central potentials.	<i>Wavefunctions (Azimuthal, Zenithal Parts), Spherical Harmonics,</i>	Same as above	Same as above

			<i>Radial Part</i>		
27	3	Understand the hydrogen atom's structure and related wavefunctions and energy levels.	<i>Hydrogen Atom, Wavefunction, Energy Levels, Examples</i>	Same as above	Same as above
28	3	Understand angular momentum, spin, and Pauli matrices.	<i>Angular Momentum, Spin Angular Momentum, Pauli Matrices, Exercises</i>	Same as above	Same as above
29	3	Understand the need for correction methods in quantum mechanics and how to apply them.	Chapter Six: <i>Correction Methods – Time-Independent Non-Degenerate Perturbation Theory, Applications</i>	Same as above	Same as above
30	3	Understand and apply the variational method.	<i>Variational Method, Applications</i>	Same as above	Same as above

11. Course Evaluation

Notes	Approximate Weight	Type of Assessment		
Includes theoretical questions and problem-solving	15%	First Midterm Exam		
Includes applied questions	15%	Second Midterm Exam		
Weekly evaluation	5%	Homework and Problem Solving		
Encouraging discussion and activities	5%	Attendance and Participation		
Covers the entire syllabus	60%	Final Exam		

12. Learning and Teaching Resources

Required textbooks	<i>Quantum Mechanics</i> by Jasim Al-Husseini and Abdul Salam Abdul Ameer, 1980, College of Science, University of Baghdad.
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Main references	• <i>Quantum Mechanics</i>, Mohammad Nabil Yass Al-Bakri and Salah Al-Din Yass Al-Bakri, 2014. • <i>Fundamentals of Quantum Mechanics</i>, Salem Hassan Al-Shammaa and Amjad Abdul Razaq Karija, 1988. • <i>Introduction to Quantum Mechanics</i>, Hashim Aboud and Diaa, 1985. • <i>Introduction to Quantum Mechanics</i>, Matthews, 1984.
Recommended books and references (scientific journals, reports...)	Books & Lectures: 1. <i>Introduction to Quantum Mechanics</i> – David J. Griffiths 2. <i>Introduction to Quantum Mechanics – Part One</i> by Prof. Dr. Mohammad Basel Al-Taie
Electronic References, Websites	Websites: • MIT OpenCourseWare – Quantum Physics Free courses from MIT including lectures, exercises, and videos. • Khan Academy – Quantum Physics Excellent simplification of core concepts for beginners with illustrations. • HyperPhysics – Quantum Mechanics Section Georgia State University site offering simplified explanations and visual diagrams of physics concepts.

Course Description Form

1. Course name and stage:					
Electromagnetic Theory					
2. Course code:					
509080404					
3. Semester/Year:					
Annual					
4. Date of preparation of this description:					
2024/4/10					
5. Number of study hours (total) / Number of units (total): 72					
Number of hours: 72 hours / Number of units: 180					
6. Name of the course supervisor:					
Prof. Dr. Ismail Abdullah Khalati and Prof. Dr. Ayser Abdul Hussein Hamad					
7. Course objectives					
This semester aims to achieve two main pillars. The first is to review the basic concepts learned in previous stages, using advanced mathematics to enable students to understand the learning procedures typical of all program chapters. The second is to provide students with a new conceptual foundation for the dynamics of charged particles moving in electromagnetic fields in vacuum and within materials. This foundation is very useful in understanding many related topics, such as communications, electrical circuits and their components, and the general uses of materials in electrical devices. The electromagnetic theory chapter addresses the basic principles of the electromagnetic force acting on a charged particle: practical foundations, electrostatics, magnetic fields of standing currents, electromotive force and magnetic induction, Maxwell's equations, the propagation of electromagnetic waves, the electrical and magnetic properties of matter, conservation laws, the close relationship between electricity and magnetism, and the propagation of electromagnetic waves in vacuum and material media. This semester utilizes advanced mathematics while simultaneously emphasizing physical phenomena and their principles.					
8. Teaching and learning strategies					
Metacognitive strategies (planning, control, and evaluation).					
Information processing strategies.					
Group presentation and discussion.					
9. Course structure					
Evaluation method	Learning method	Name of unit or topic	Required learning outcomes	Hours	Week
Written exam and	All methods	Chapter One-(Vector Analysis); Definitions,	Understand and comprehend the	3	1
				3	2

social discussion	mentioned in paragraph (10)	Vector Algebra, Law of vectors algebra, Component of vector, Dot product, Cross product, Triple product, Derivative, Gradient, Divergence, Curl, Coordinate system, Vector Integration, Line integral, surface integral, Volume integral, Divergence and divergence theorem, Curl and Stocks theorem, Problems.	concepts of vector analysis and algebra, the physical meaning of divergence, involution, gradient, and various types of integrals, in addition to divergence and involution theorems.	3	3
				3	4
Written exam and social discussion	All methods mentioned in paragraph (10)	Chapter Two-(Electrostatic); Electric Charge, Coulomb's Law, The electric Field, Electric potential, Electrostatic potential energy, Flux and flux density, Gauss Law, Integral form of Gauss Law, Differential form of Gauss Law, Application of Gauss Law, Conductors and Insulators, The Electric Dipole, Multiple Expansion of Electric field, Problems.	Understanding and comprehending the most important laws of electricity, namely Coulomb's Law, and how to derive voltage, field, and electric energy from it, leading to Gauss's Law and its most important practical applications.	3	5
				3	6
				3	7
				3	8
Written exam and social discussion	All methods mentioned in paragraph (10)	Chapter Three – (Electrostatic Boundary Value Problems); Poisson's equation, Laplace's equation, Solution of Laplace's and Poisson's equation in one dimension (Cartesian coordinates, cylindrical coordinates and Spherical coordinates,), two dimensions (Cartesian coordinates, cylindrical coordinates and Spherical coordinates,) and three dimensions: - Cartesian coordinates, cylindrical coordinates and Spherical coordinates, Uniqueness of Solutions to Electrostatic Problems	Understand and comprehend the applicability of Laplace's and Poisson's equations to determine potential, field, and electric flux for real-life problems.	3	9
				3	10
				3	11
				3	12
Written exam and social discussion	All methods mentioned in paragraph (10)	Chapter Four-Electrostatic Field in Dielectric Media; Polarization and Dipole Moment Density, Field Outside of dielectric Medium, The electric Field Inside a	Understanding how insulating materials behave when exposed to an electric field, how they accept it, and what polarization is, leading	3	13
				3	14
				3	15
				3	16

		Dielectric, Gauss's Law, in a dielectric – the Electric Displacement, Electric Susceptibility and Dielectric Constant, Point Charge in a dielectric Fluid, Boundary conditions on the field Vectors, Boundary – Value problems Involving Dielectrics, Dielectric Sphere in a Uniform Electric Field, Force on a point Charge Embedded in a Dielectric, Problems.	to understanding the reasons for using these materials in electrical components such as capacitors.		
Written exam and social discussion	All methods mentioned in paragraph)10(	Chapter Five- The Electric Current; Nature of the current, Current density, Equation of continuity, Ohm's Law: Conductivity, Resistance networks, Electromotive force, Steady currents in media without sources of emf, Approach to electrostatic equilibrium, Problems.	Understand and comprehend the nature of electric current, its density, the law of conservation of charge, steady state, Ohm's law, and electromotive force.	3	17
				3	18
				3	19
				3	20
Written exam and social discussion	All methods mentioned in paragraph)10(	Chapter Six-The Magnetic Field of Steady Currents; The definition of magnetic induction, Forces on current-carrying conductors, The Law of Biot and Savart, Elementary applications of the Biot and Savart law, Ampere's circuital law, The magnetic vector potential, The magnetic field of a distant circuits, The magnetic scalar potential, Magnetic flux, Problems.	Understand and comprehend how the magnetic field is generated by the movement of electric charges and its practical applications.	3	21
				3	22
				3	23
				3	24
Written exam and social discussion	All methods mentioned in paragraph)10(	Chapter Seven- Magnetic Properties of Matter; Magnetization, the magnetic field produced by magnetized density, Magnetic scalar potential and magnetic density, Sources of magnetic field, Magnetization density, The field equations, Magnetic susceptibility and permeability, Hysteresis,	Understand and comprehend how materials respond to magnetism and how these materials are classified accordingly.	3	25
				3	26
				3	27
				3	28

		Boundary conditions on the field vectors, Problems.			
Written exam and social discussion	All methods mentioned in paragraph)10	Chapter Eight-Microscopic Theory of Magnetism; Molecular field inside matter, The origin of diamagnetism, The origin of paramagnetic, Problems.	Understand and comprehend the origin of diamagnetism and Para magnetism.	3	29
				3	30

10. Course Evaluation

- 1- The agreed-upon monthly exam.
- 2- The surprise exam.
- 3- Asking questions during the lecture.

11. Learning and teaching resources

1. John R. Rietz and Frederick J. Milford, 1960, Foundation of Electromagnetic Theory, USA, Addison and Wesley Publishing Company. 2. Greiner Walter, 2002, Classical Electrodynamics, Germany, Springer	Required textbooks (methodology if any)
1. David J. Griffiths, 1999, Introduction to Electrodynamics, USA, Prentice Hall. 2. Jack Vanderlinde, 2005, Classical Electromagnetic Theory, USA, Kulwer Academic Publishers. 3. Joseph A. Edminister, 1998, Theory and Problems of Electromagnetic- Schaum's Outline, USA, McGraw Hill.	Main References (Sources)
1. John David Jackson, 1978, Classical Electrodynamics, USA, John Wiley & Sons. 2. William H. Hayat and John A. Buck, 2001, Engineering Electromagnetics, USA, McGraw Hill. Bo Thide, 2004, Electromagnetic Field Theory, Sweden, Uppsala University.	Recommended supporting books and references (scientific journals, reports...)
1. Iraqi Virtual Science Library. 2. http://books.pakchem.net/physics-books.html http://www.motionmountain.net/?gclid=CJzx2v-tlsYCFUnItAod0mEALQ	Electronic references, websites

Laser – Fourth Level (Morning and Evening)

1. Course Name:	
Physics of Laser	
2. Course Code:	
509080405	
3. Semester / Year:	
Annual/2024	
4. Description Preparation Date:	
30/10/2024	
5. Available Attendance Forms: Bachelor	
6. Number of Credit Hours (Total) / Number of Units (Total)	
Number of hours: 90 hours / Number of units: 180	
7. Course administrator's name (mention all, if more than one name)	
1 – Dr. Mariam Mohamed Abud	
2– Dr. Baha'a A.M.Al Hilli	
8. Course Objectives	
It is one of the academic courses for fourth-year students in the physics departments of the Faculties of Education, with three theoretical hours per week. This course is considered one of the branches of theoretical physics, and its theoretical part aims to introduce the student to the basic concepts of laser science, the basics of lasers, laser components, types of lasers, characteristics, uses, and applications of lasers.	
9. Teaching and Learning Strategies	

Strategy	Laser physics is a branch of physics that studies and explains everything related to the basics of lasers, the difference between lasers and masers, the formation of a blackbody beam, the rate of absorption and spontaneous emission, the emission, and the types of lasers that are used in many other sciences such as chemistry, medicine, and engineering. Laser physics has been used in many applications such as medicine, communications, holography, and others.				
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Ability to explain basic principles	Chapter One – The Interaction of Radiation with Matter Absorption rate, spontaneous transfer rate and simulation rate	Smart board, whiteboard and pen	Daily homework and questions
2	3	Ability to explain basic principles	Permitted and prohibited transitions – transition	Laptop, smart screen, display screen	Daily exam

			section, absorption rate and gain coefficient		
3	3	Explain the basic principles of physics related to lasers,	Einstein's calculations of probability coefficients	display screen	Activities
4	3	Explain the basic principles of physics related to lasers,	– Permitted and Prohibited Moves 5 – Move Clip	Laptop, smart screen, display screen	Daily homework and questions
5	3	To know the theoretical and practical aspects that students can learn during their study of Laser Physics.	Spectral line broadening operations	Laptop, smart screen, display screen	Duties
6	3	And analysis of its basic components such as the active medium	Occupancy of levels – energy levels of the molecule	Laptop, smart screen, display screen	Activities

7	3	Ability to communicate effectively on laser physics topics	Solve the questions of the first chapter	whiteboard, pen, and screen	Duties
8	3	Testing students' knowledge and theoretical understanding of laser physics	First monthly exam	Exam papers	Daily homework and questions
9	3	To know the theoretical and practical aspects that students can learn during their study of Laser Physics.	Chapter Two: Lasers and Masers Gain Factor	For whiteboard, pen and screen	Activities
10	3	To know the theoretical and practical aspects that students can learn during their study of Laser Physics.	Threshold condition	Laptop, smart screen, display screen	Daily homework and questions
11	3	To know the theoretical and practical aspects that students can learn during their study of Laser Physics.	Pumping works	whiteboard, pen, and screen	Activities

12	3	Student Comprehension Test	Pumping Methods Chapter Two Questions Answered	whiteboard, pen, and screen	Duties
13	3	Test students' understanding of laser basics	Second exam	Exam papers	Daily homework and questions
14	3	Develop thinking skills	Resonator stability condition – Types of resonators	Laptop, smart screen, display screen	Daily homework and questions
15	3	Develop thinking skills	Resonator stability – Resonator modes	Laptop, smart screen, display screen	Activities
16	3	Ability to understand how to design laser systems	Formula of resonator– Q–switching factor	Laptop, smart screen, display screen	Daily homework and questions
17	3	Ability to understand how to design laser systems	Chapter Four: Laser Results and Modifications	Laptop, smart screen, display screen	Daily homework and questions

18	3	View the latest developments in laser technology	– Continuous operation and time–dependent operation Selection of laser emission spectral lines	Laptop, smart screen, display screen	Activities
19	3	Develop critical thinking skills	Selecting a separate mode Q–Switching Mode Locking	Laptop, smart screen, display screen	Daily questions
20	3	Develop critical thinking skills	Laser beam properties	Laptop, smart screen, display screen	Daily questions
21	3	Develop critical thinking skills	Chapter 5 Nonlinear Optics – Phase Matching	whiteboard, pen, and screen	Daily questions

22	3	Ability to communicate effectively on laser physics topics, both in writing and orally.	Optical parameter oscillation	whiteboard, pen, and screen	Daily questions
23	3	Written Student Test: Understanding Laser Technology	First exam of the second semester	Exam papers	
24	3	Ability to understand how to design laser systems and analyze their basic components such as the active medium, power source, and cooling system.	Types of Lasers Solid-State Lasers: 1– – Ruby Laser 2– Nd-YAG & Nd-Glass Lasers	Laptop, smart screen, display screen	Laser devices as visual aids
25	3	Ability to understand how to design laser systems and analyze their basic components such as the active medium, power source, and cooling system.	Gas-State Lasers 1– Helium–Neon Laser (He-Ne Laser) – Argon Ion Laser (Ag++Laser)	Laptop, smart screen, display screen	Laser devices as visual aids

			– Carbon Dioxide Laser (CO ₂ Laser)		
26	3	Ability to understand how to design laser systems and analyze their basic components such as the active medium, power source, and cooling system.	Excimer Laser Liquid-State Lasers 1 – Dye Laser	Laptop, smart screen, display screen	Laser devices as visual aids
27	3	Knowing the different applications of lasers in fields such as medicine,	Chapter Seven: Some Uses of Lasers 1 Communications, Industry, and Scientific Research	Laptop, smart screen, display screen	Activities
28	3	Know the various applications of lasers in fields such as medicine, communications, industry, and scientific research.	– Optical Communications 4– Measurements and Testing 5– Military Uses	Laptop, smart screen, display screen	Activities

29	3	Understand the safety standards when handling laser devices and how to use them safely.	Chapter Eight: Safety and Security in Laser Laboratories 1– Laser Hazards 2– Safety Requirements	Laptop, smart screen, display screen	Activities
30	3	Test critical thinking skills and problem–solving ability related to laser applications.	Second exam for the second semester	Exam papers	

11. Course Evaluation

20 first semester and 20 second semester, including daily and monthly exams, homework, student interaction, and daily questions. 60 final exam.

12. Learning and Teaching Resources

Required textbooks	Principles and Fundamentals of Lasers / Siham Qandala / (1986) and Understanding Laser Technology, translated by Riyad Mirza
Main references	Principles and Basics of Laser / Siham Qandala / (1986)
Recommended books and references (scientific journals, reports...)	C.Breck Hitz Lasers
Electronic References, Websites	All books and websites related to lasers, in addition to the book Understanding Laser Technology, written by Riad Mirza.

Measurement and Evaluation – First Level (Morning and Evening)

1. Course Name:	
Measurement and Evaluation Fourth morning and evening for the Physics Department	
2. Course Code:	
509080406	
3. Semester / Year:	
Annual/2024	
4. Description Preparation Date:	
30/10/2024	
5. Available Attendance Forms: Bachelor	
Attendance/Weekly	
6. Number of Credit Hours (Total) / Number of Units (Total)	
Number of hours: 90 hours / Number of units: 180	
7. Course administrator's name (mention all, if more than one name)	
Prof. Intisar Kazem Jawad Sabahi Masai	
8. Course Objectives	
The student's definition of the concept of measurement and evaluation	
The student explains the importance of measurement and evaluation.	
The student compares measurement and evaluation.	
9. Teaching and Learning Strategies	
Strategy	1. Research and exploration 2. Feedback 3. Brainstorming 4. Mind mapping

		5. Discussion and dialogue			
		6. Thinking beyond knowledge, tests, and educational and psychological tools			
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Cognitive objectives	Education: Definition, Objectives, Characteristics	Discussion panels	Written tests
2	3	Upon completion of the course, students will have knowledge of the fundamentals of measurement (its concept, rationale, steps, priorities, and requirements).	The pillars of measurement and evaluation, their importance and necessity, and their foundations	Documentary films	Oral exams
3	3	Students learn how to lay the right foundations by	The basics and steps in formulating questions	Video lectures	Daily tests

		following the necessary steps.			
4	3	Helps students set future goals and objectives through education.	Student communities and others	Giving lectures	Reports
5	3	Skill objectives	General objectives and how to prepare them		
6	3	Teaching learners to acquire information .	Specific goals and how to formulate them		
7	3	Training learners to apply scientific fundamentals.	Specific goals and how to formulate them		
8	3	Use of modern technological techniques in developing modern methods	Types of measurement		

9	3	Emotional goals	Measuring instruments		
10	3	Confirm student interaction.	Fundamentals and characteristics of measurement		
11	3	Giving students excitement	Measurement classification		
12	3	The importance of measurement and types of educational and psychological tools	The importance of measurement and its programs		
13	3		The importance of measurement and types of educational and psychological tools		

14	3		The philosophical foundations of measurement		
15	3		First Term Exam		
16	3		The relationship between measurement and other sciences		
17	3		The economic basis for measurement		
18	3		Measurement and its role in economic development		
19	3		Measurement and its role in human development		

20	3		Scientific foundations of measurement		
21	3		The impact of measurement and education and their relationship with society		
22	3		Measurement and technological progress		
23	3		Measurement and evaluation		
24	3		What is the difference between measurement and evaluation?		

25	3		The calendar: its concept and origins		
26	3		Types of calendars		
27	3		Its foundations and characteristics		
28	3		Calendar bases		
29	3		The modern calendar		
30	3		Second Term Exam		

11. Course Evaluation

Grades are distributed out of 100 according to the tasks assigned to the student, such as daily preparation, daily exams, oral exams, monthly exams, written exams, reports, etc.

First semester exam 20 points

Second semester exam

20 points Annual average 40 points

Activities and tests Daily and monthly exams and daily preparation

Final exam 60 points

12. Learning and Teaching Resources

Required textbooks	The Book of Measurement and Evaluation
Main references	Calendar measurement Dr. Mohame
Recommended books and references (scientific journals, reports...)	Educational and Psychological Measurement and Assessment by Dr. Salahuddin Mahmoud Allam, 2020
Electronic References, Websites	/https://edu-women.aliragia.edu.iq

– FourthLevel (Morning and Evening)

1. Course Name:	
Lab physics	
2. Course Code:	
509080408	
3. Semester / Year:	
Annual/2024	
4. Description Preparation Date:	
30/10/2024	
5. Available Attendance Forms: Bachelor	
Weekly	
6. Number of Credit Hours (Total) / Number of Units (Total)	
60 hours / Number of units: 120	
7. Course administrator's name (mention all, if more than one name)	
1 – Lec. Dr. Asmaa Mohammed Raoof	
2.Lec. Dr. Raheem LAFTA ALI	
8. Course Objectives	
The curriculum aims to enable students to define plasma and study its most important properties and parameters, as well as study the behavior of particles within fixed and changing electric and magnetic fields. It also covers plasma as a fluid, electrical discharge plasma, plasma systems, plasma diagnostic methods, and important plasma applications.	
9. Teaching and Learning Strategies	
Strategy	Develop a plan for asking questions, setting questions, and setting daily quizzes.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Ability to understand the concept of plasma. Know how plasma exists in nature. Compare the four states of matter.	Introduction, definition of plasma, occurrence of plasma in nature, plasma forms, importance of studying plasma, types of plasma,	– Smart board – Discussion – Connecting the material to reality developing a plan for	Daily, oral, and written exams
2	2	Distinguish between gas and plasma. Distinguish between the types of plasma. Determine the importance of studying plasma.	general properties of plasma, Saha equation, plasma parameters, temperature, plasma frequency, Debye shielding, some plasma applications, nuclear fusion reactors,	g questions, setting ions, and ducting daily quick	(on the board and on paper) – Solving problems for each chapter on the board
3	2	State the types of plasma. Distinguish between the types of plasma. Determine the importance of studying plasma. State the types of plasma.	magnetohydrodynamic generators, plasma jet propulsion.		– Periodic monthly exams
4	2	Identify the general properties of plasma. Understand the concept of ionization degree. Interpret the Saha equation for calculating ionization degree.			
5	2	Understand the concept of plasma frequency. Understand the concept of Debye shielding. Identify the effect of temperature on Debye shielding. Distinguish			

		between the types of Debye shielding.			
6	2	Learn about Maxwell's equations. Understand the physical meaning of Maxwell's equations.	Chapter Two: Motion of a Single Charged Particle, Introduction, Maxwell's Equations, Motion of a Particle in Uniform Electric and Magnetic Fields, Electric Field = Zero, Constant Electric Field, Motion of a Particle in Non-Uniform Magnetic Fields, Field Slope Drift, Field Curvature Drift, Magnetic Mirrors, Motion of a Particle in Time-Varying Fields, Motion in a Time-Varying Electric Field, Motion in a Time-Varying Magnetic Field		
7	2	Study of the behavior of plasma particles under uniform magnetic fields. Study of the behavior of plasma particles under uniform magnetic fields and constant electric fields.			
8	2	Explain the concept of Larmor frequency, Larmor radius.			
9	2	Understand the behavior of plasma as a diamagnetic material. Describe the magnetic field gradient.			
10	2	Understand the behavior of plasma within non-uniform magnetic fields (variable with position and time).			
11	2	Explain the effect of electric fields on the motion of plasma particles. Explain the concept of magnetic moment.			
12	2	Explain the working principle of magnetic mirrors.			
13	2	Explain the concept of polarization drift.			
14	2	The difference between plasma as a single particle and plasma as a fluid, hydrodynamic equations	Chapter Three: Study of Plasma as a Fluid Introduction, Equation of Motion for Fluids, Equation of		

15	2	Equation of Motion for a Fluid.	Continuity, Fluid Flow Perpendicular to a Magnetic Field, Fluid Flow Parallel to a Magnetic Field, Magnetic Pressure, and the Contraction Phenomenon		
16	2	Continuity Equation and Law of Conservation of Mass Fluid Flow			
17	2	Perpendicular to a Magnetic Field			
18	2	Fluid Flow Parallel to a Magnetic Field			
19	2	Magnetic Pressure			
20	2	Magnetic Contraction Phenomenon			
21	2	Industrial Plasma Examples of Industrial Plasma Low-pressure discharge, Atmospheric-pressure discharge, Radiation plasma	Chapter Four: Glow Discharge Plasma, Industrial Plasma Examples of Industrial Plasma, Low-Pressure Discharge, Atmospheric-Pressure Discharge, Radiation Plasma, Electron Flow in Evacuated Tubes, Glow Discharge Plasma Generation Mechanism, Glow Discharge Zones, Plasma Systems, Plasma Diagnostic Methods, Applications of Electric Discharge Plasma, Etching Process, Wet Chemical Etching, Dry Etching, Plasma Etching Mechanics		
22	2	Electron flow in evacuated tubes, Glow discharge plasma generation mechanics,			

23	2	Plasma systems, Plasma diagnostic methods, Applications of electrical discharge plasma,			
24	2	Drilling process, Wet chemical drilling,			
25	2	Dry drilling, Plasma drilling mechanics,			
26	2	Advantages of plasma used in drilling, Glow discharge zones,			
27	2	Introduction to the most important applications of plasma, plasma diode	Chapter Five: Plasma Applications Introduction, plasma diodes, energy losses in plasma diodes, plasma rocket propulsion, ion propulsion, major problems in jet propulsion engines, conventional displays, plasma displays, their advantages and disadvantages, industrial applications of plasma, plasma and the environment.		
28	2	Energy losses in plasma diode, plasma rocket propulsion	Chapter Five: Plasma Applications Introduction, plasma diodes, energy losses in plasma diodes, plasma rocket propulsion, ion propulsion, major problems in jet propulsion engines, conventional displays, plasma displays, their advantages and disadvantages, industrial applications of plasma, plasma and the environment.		
29	2	Ion propulsion, major			

		problems in jet propulsion engines Conventional displays,			
30	2	plasma displays, their advantages and disadvantages, industrial applications of plasma, plasma and the environment			

11. Course Evaluation

1. Conduct classroom discussions
2. Answer questions
3. Take quick tests to assess students' level

12. Learning and Teaching Resources

Required textbooks	
Main references	Francis F.Chen,” Introduction to plasma physics”, Plenum Press, 1995.
Recommended books and references (scientific journals, reports...)	1. Dr. Asim Abdul Karim Azouz, "Introduction to Plasma Physics," University of Mosul, 1991. 2. Dr. Baha Hussein Saleh, "Fundamentals of Plasma Physics," Al-Qayadi Edition, 2009. 3. Dr. Walid Mustafa Sahioni, "Introduction to Plasma Physics," Dar Al-Fikr Al-Mu'aser, 2006.
Electronic References, Websites	1. http://www.alkoon.alnomrosi.net 2. https://ar.wikipedia.org

	3.
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[http://www.hazemsakeek.](http://www.hazemsakeek.net)

net

English – Fourth Level (Morning and Evening)

Course Name: .1
English
Course Code: .2
509080410
Semester / Year: .3
Annual/2024
Description Preparation Date: .4
30/10/2024
Available Attendance Forms: Bachelor .5
Number of Credit Hours (30) / Number of Units (12) .6
Course administrator's name (mention all, if more than one name) .7
1 – Prof. Dr. Zina Abdali
2– Asst. Instr. Nora Abdalnabi
Course Objectives .8
Usage the composition and comprehension in correct way what skills are used in reading and listening. recognition and identification of word . conversational expression english grammar in use translation . Urge and encourage students . Commitment to the curriculum of university tuition .

Can be classified methods and learning Education approved according to a ,totalitarian system that combines education system which focuses on the professor learning, which focuses on the learner, or the interaction between them, particularly our dependence on modalities to move them into a continuous path called the methods of communication or interaction, the most commonly used methods in the information age, as they continue learning the transmission of information and feedback between teacher and learner, or between the poles of transmitter and .receiver in the communication process

In light of the classification for interactive teaching and learning of the learner to continue learning from the human confrontation, or a software program, or of .modern media and communication that has spread in our daily lives

,Modern methods in the teaching of the English language is communicative interactive is one of the most important and the latest educational methods which

		focus on the professor, the modalities lectures, and it focuses on the transfer of information from the records to the listener or viewer It is noted that the diversity of methods useful in teaching and learning as a useful diversity in education techniques, to be seen to education, hardware, software and methods techniques in a single system, and in addition to the way the human use of it, which supports the teaching systems			
Course Structure .10					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	1	Develop listening for gist and specific information. Use present tenses accurately.	No Place Like Home	Communicative activities, and pair work.	Vocabulary quiz
2	1	Engage in conversations to describe routines and recent activities.	No Place Like Home	role-play.	speaking task.
3	1	Talk about life choices using modal	Been There, Done That!	Storytelling exercises.	Written assignment

		verbs of advice and obligation. Write a personal narrative.			
4	1	Understand use of narrative tenses.	Been There, Done That!	writing workshops	grammar quiz.
Exam					
6	1	Report past events using reported speech. Identify tone and attitude in storytelling.	What a Story!	Listening to stories.	Listening test
7	1	Express sympathy and interest.	What a Story!	retelling in pairs.	oral retelling.
8	1	Question forms; negatives;	Nothing But the Truth	Debate, ad analysis,	Group presentation
9	1	hypothetical conditional structures	Nothing But the Truth	vocabulary building.	vocabulary quiz.

10	1	Exam			
11	1	Future forms; modal verbs	An eye to the future	dialogues on future scenarios	vocabulary quiz Focus on future “will,” “going to,” modals
12	1	expressing obligation/advice	Making it big	Prediction games	Group presentation
13	1	Summarize news reports using passive voice. Understand bias in media..	Getting on together	Listening to news	Summary writing
14	1	Practice note-taking skills	Going to the extreme	summarizing	listening test.
		Exam			
15	1	Expressing opinions; describing past states;	Going to the extremes	Storytelling;	Comparative essay

16	1	narrative tenses	Forever Friends	comparing personal past/present	listening quiz
17	1	Time expressions; idioms	Risking life	timed discussions	Pronunciation test
18	Exam				
19	1	stress and rhythm	Risking life	Listening for stress patterns	idiom quiz
20	1	Idiomatic expressions; vocabulary building	In your dreams	Lexical exercises	Vocabulary quiz
21	1	informal speech	In your dreams	groupwork on new texts	speaking presentation
22	1	Zero, first, second, third conditionals;	It's never too late	Error correction;	test
23	Exam				
25	1	review	It's never too late	conversational drills	peer review
25	1	Target weak areas based on diagnostics	Error Correction	corrective feedback	Diagnostic revision test
26	1	Target weak areas based on diagnostics	Grammar Mastery	Focused grammar drills	individual

					feedback
27	1	Formal exam structure, timed tasks	Test Techniques & Exam Prep	Mock tests in exam conditions	Mock exam results
28	1	revision strategies	Test Techniques & Exam Prep	Mock tests in exam conditions	far feedback
29	1	Fluency development, public speaking	Fluency Practice	Debates, presentations	Oral presentation
30	1	peer feedback	Revision	peer-evaluation sessions	fluency rubric
Course Evaluation .11					
The theoretical exam . The question and answer oral . Posts effective in the classroom . Adoption of classroom discussions . resolving questions . answer for quick examinations Rated level students . Mental Tests . General Performance Tests. Quarterly exams					

Research. student achievement in general during the school year.	
Learning and Teaching Resources .12	
Required textbooks	Headway Plus: Upper intermediate
Main references	Headway Plus: Upper intermediate (students book) Headway Plus: Upper intermediate (activity book)
Recommended books and references (scientific journals, reports...)	Interchange: Fourth Level (Cambridge University)
Electronic References, Websites	https://www.cambridgeenglish.org https://www.youtube.com/user/bbclearningenglish