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

Academic Program and Course Description Guide

2024

Introduction:

The educational program is a well-planned set of courses that include procedures and experiences arranged in the form of an academic syllabus. Its main goal is to improve and build graduates' skills so they are ready for the job market. The program is reviewed and evaluated every year through internal or external audit procedures and programs like the External Examiner Program.

The academic program description is a short summary of the main features of the program and its courses. It shows what skills students are working to develop based on the program's goals. This description is very important because it is the main part of getting the program accredited, and it is written by the teaching staff together under the supervision of scientific committees in the scientific departments.

This guide, in its second version, includes a description of the academic program after updating the subjects and paragraphs of the previous guide in light of the updates and developments of the educational system in Iraq, which included the description of the academic program in its traditional form (annual, quarterly), as well as the adoption of the academic program description circulated according to the letter of the Department of Studies T 3/2906 on 3/5/2023 regarding the programs that adopt the Bologna Process as the basis for their work.

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

Concepts and terminology:

Academic Program Description: The academic program description provides a brief summary of its vision, mission and objectives, including an accurate description of the targeted learning outcomes according to specific learning strategies.

Course Description: Provides a brief summary of the most important characteristics of the course and the learning outcomes expected of the students to achieve, proving whether they have made the most of the available learning opportunities. It is derived from the program description.

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

Program Mission: Briefly outlines the objectives and activities necessary to achieve them and defines the program's development paths and directions.

Program Objectives: They are statements that describe what the academic program intends to achieve within a specific period of time and are measurable and observable.

Curriculum Structure: All courses / subjects included in the academic program according to the approved learning system (quarterly, annual, Bologna Process) whether it is a requirement (ministry, university, college and scientific department) with the number of credit hours.

Learning Outcomes: A compatible set of knowledge, skills and values acquired by students after the successful completion of the academic program and must determine the learning outcomes of each course in a way that achieves the objectives of the program.

Teaching and learning strategies: They are the strategies used by the faculty members to develop students' teaching and learning, and they are plans that are followed to reach the learning goals. They describe all classroom and extra-curricular activities to achieve the learning outcomes of the program.

Academic Program Description Form

University Name: Basrah

Faculty/Institute: Science

Scientific Department: Physics

Academic or Professional Program Name: BSc of physics

Final Certificate Name: BSc of physics

Academic System: Courses

Description Preparation Date: 10/9/2025

File Completion Date: 10/9/2025

Signature:

Head of Department Name:

Prof. Dr. Wail A. Godaymi Al-Tumah

Date: 10/9/2025

Signature:

Scientific Associate Name:

Date:

الأستاذ الدكتور
عادل علي عبد الحسن
معاون العميد للشؤون العلمية والدراسات العليا

The file is checked by:

Department of Quality Assurance and University Performance

Director of the Quality Assurance and University Performance Department:

Date: Dunya Ali Hussain

Signature:

10/9/2025

Approval of the Dean

الاستاذ الدكتور
علي عبد الامام عبد الزهرة
عميد كلية العلوم / جامعة البصرة

1. Program Vision

The Department of Physics seeks to be a scientific center of excellence at the national and international levels in the fields of education, scientific research, and technological applications, by preparing qualified graduates who possess deep knowledge and practical skills, and are able to contribute to the development of modern sciences and serve the community in line with quality standards and academic accreditation.

2. Program Mission

The Department of Physics aims to provide a stimulating academic and research environment that enables students to acquire basic and advanced knowledge in the physical sciences, and develop their skills in scientific research, critical thinking, mathematical and experimental analysis. The department also seeks to prepare cadres capable of keeping pace with scientific and technological developments, contributing to solving scientific and industrial problems, and serving the community with a spirit of responsibility and professional ethics.

3. Program Objectives
1- Teaching the student the basic principles of physics
2- The educational objectives of the program (printed) and in line with the vision of the educational institution
3- Preparing an educated generation that is armed with science and adopts it as a sound basis to bring about radical change, and to put scientific knowledge and the scientific method in thinking, analysis, and adaptation to the development of technologies in order to keep pace with the expansion of human needs.
4- Providing an academic climate suitable for research and learning enables the student to pursuehis higher education and contribute to finding solutions to problems using appropriate and appropriate technologies.
5- The program should have a continuous evaluation process for programmed periods of time that show that the goals are tailored to the needs.
6- Preparing specialists in general physics and its practical applications, which are responsible for studying the country's need for development and progress and are able to meet the needs of the labor market in state institutions and industrial sectors.
7- There should be an ongoing evaluation and evaluation process for all the program vocabulary that shows the degree to which the objectives were set.

4. Program Accreditation
Does the program have program accreditation? And from which side? **The program did not receive program accreditation from the National Council for Accreditation of Science Specialization Programs.**

5. Other External Influences
Frequent official holidays

6. Program Structure

Reviews*	Percentage	Study Unit	Number of Courses	Program Structure
	100%	13	6	**Enterprise Requirements**
	100%	32	10	**College Requirements**
	100%	98	35	**Department Requirements**
	100%	--	Yes	**Summer Training**
				Other

7. Program Description

Credit Hours		Course or course name	Course or course code	Year/Level
practical	theoretical			
3	3	Principles of Mechanics	P101	First
3	2	Material Properties	P102	
3	3	Electrical and magnetic	P103	
3	3	Light	P104	
2	3	Calculators (1)	A127	
	3	Calculus (1)	R101	
	3	Calculus (2)	R102	
	3	Linear algebra	R129	
3	3	chemistry	K131	
	3	culture	W101	
	1	sport	S101	
	2	Arabic literature	D101	
	2	Analytical Mechanics	P201	The second
3	3	Electrical and magnetic	P203	
3	3	Light	P204	
	3	Modern Physics	P207	
3	3	Principles of Electronics	P208	
	3	Thermodynamics	P212	
	2	Fundamentals of Geophysics	P227	
	3	Advanced Calculus	R201	
	3	Differential equations	R214	
3	3	Calculators (2)	A260	
	3	culture	W201	
	3	Quantum Mechanics	P301	The third
	2	Analytical Mechanics	P302	
	3	Electromagnetism	P303	
3	3	Atomic physics	P307	

3	3	Electronics	P308	
	3	Mathematical Physics	P315	
	3	Astronomy	P326	
3	3	Calculators (3)	A327	
	2	English literature	D301	
	2	Solar Energy	P309	
	2	Logic Circuits	P310	
	2	X-rays	P318	
	2	Hardware Physics	P 338	
	2	Reagents and detection methods	P321	
	2	Spectroscopy	P322	
	2	Relativity Theory	P342	
	3	Quantum Mechanics	P401	Fourth
		Research Project	P405	
	3	Statistics	P409	
3	3	Laser	P413	
	4	Advanced Athletic	P415	
	3	Solid State	P427	
3	2	Calculators (4)	H460	
	2	philosophy	Q400	
	2	Optical Devices	P412	
	2	Microwave	P420	
	2	Antennas	P421	
	2	Advanced Solid	P428	
	2	Thin Films	P429	
	2	Semiconductors	P430	
	2	Liquid crystals	P431	
	2	polymer	P432	
	2	Health Physics	P436	
	2	Molecular	P437	
	2	Nano	P457	

8. Expected Learning Outcomes of the Program	
Knowledge	
2- Making the student able to know and understand the practical applications of physics.	1- To make the student able to know and understand the basics of physics.
4- Making the student able to know and understand the basics of physics through the use of modern software.	3- Making the student able to understand physical phenomena from a mathematical point of view.
Skills	
2. Constructive scientific discussions and opinions.	1- Sound scientific research.
4. The ability to apply the experience gained from his studies in the fields of practical life, taking into account industrial and commercial constraints.	3- Enable the student to understand and solve scientific problems related to the laws of physics.
Values	
2- Linking the information to the environmental reality and the Earth system and the extent of its impact on various living organisms.	1- The ability to communicate information after presenting, discussing, and interpreting it.

9. Teaching and Learning Strategies
1- Use of the Ballpoint and Pen 2- View lectures with PowerPoint software 3- Using practical study methods for students through the practical laboratories available in the department and under the supervision of the academic staff 4- Graduation Projects

10.Evaluation Methods

1- Follow-up of daily attendance
1- Conducting daily quizzes
2- Monthly Tests (Theoretical and Practical)
3- Final Exam
4- Summer Training
5- Seminars + Reports

Pursuit 40%, final exam 60% and grades are divided according to the approved teaching system (courses or Bologna track) and the number of units for each course, taking into account the presence or absence of a practical aspect (scientific laboratories).

11.Faculty

Faculty Members

Prepare the faculty		Special requirements/skills (if applicable)	Specialization		Academic Rank
lecturer	angel		special	year	
	1		Molecular Physics	Physics	Professor
	1		Laser Applications	Physics	Professor
	1		Atomic and Molecular Physics	Physics	Professor
	1		Polymer Physics and Applications	Physics	Professor
	1		Thin Films	Physics	Professor
	1		Nanotechnology	Physics	Professor
	1		Optics	Physics	Professor
	1		Micro Antennas	Physics	Professor
	1		Crystal development	Physics	Professor
	1		Polymers	Physics	Assistant Professor
	1		Theoretical Nuclear Physics	Physics	Assistant Professor
	1		Physics	Physics	Assistant Professor
	1		Nanotechnology	Physics	Assistant Professor
	1		Nanotechnology	Physics	Assistant Professor
	1		Optic/Optical Electronics	Physics	Assistant Professor

	1		Nanotechnology and Renewable Energies	Physics	Assistant Professor
	1		Nanotechnology	Physics	Assistant Professor
	1		Solid State Physics	Physics	Assistant Professor
	1		Electromagnetic calculations	Physics	Assistant Professor
	1		Thermodynamics	Physics	Assistant Professor
	1		Polymer Physics	Physics	Assistant Professor
	1		Polymer Physics	Physics	Assistant Professor
	1		Nanotechnology	Physics	Assistant Professor
	1		Optics and Information Visual Security	Physics	Assistant Professor
	1		Optical and microwave communications	Physics	Assistant Professor
	1		Connections	Physics	Assistant Professor
	1		Nonlinear photonicism	Physics	Assistant Professor
	1		Laser Applications	Physics	Assistant Professor
	1		Molecular Physics	Physics	teacher
	1		Polymer Physics	Physics	teacher
	1		Applied Physics	Physics	teacher
	1		space	Physics	teacher
	1		Electromagnetic calculatic	Physics	teacher
	1		Applied Physics	Physics	teacher
	1		Theoretical Physics of Atomic and Ion	Physics	teacher
	1		Radiological	Physics	teacher
	1		Nuclear/theoretical structure	Physics	teacher
	1		space	Physics	teacher
	1		Thin Films in Solar Cell Applications	Physics	teacher
	1		Medical Physics	Physics	teacher

	1		Nanotechnology	Physics	teacher
	1		Biophysics	Physics	teacher
	1		Atomic and Molecular Physics	Physics	teacher
	1		Nonlinear optics	Physics	teacher
	1		Solid	Physics	teacher
	1		Solid	Physics	Assistant Lecturer
	1		Nanotechnology	Physics	Assistant Lecturer
	1		Life Physics	Physics	Assistant Lecturer
	1		Calculators	Physics	Assistant Lecturer
	1		Connections	Physics	Assistant Lecturer
	1		Electromagnetic calculations	Physics	Assistant Lecturer
	1		Nuclear physics	Physics	Assistant Lecturer
	1		Nanotechnology	Physics	Assistant Lecturer
	2		Theoretical Physics	Physics	Assistant Lecturer
	1		Laser Applications	Physics	Assistant Lecturer
	1		Laser & Optics	Physics	Assistant Lecturer
	1		Nanotechnology	Physics	Assistant Lecturer
	1		Electro-optical laser	Physics	Assistant Lecturer
	1		Biophysics	Physics	Assistant Lecturer
	1		Calculators	Physics	Assistant Lecturer
	1		Nanoparticles	Physics	Assistant Lecturer

Professional Development

Mentoring new faculty members

1. Official daily working hours must be adhered to.
2. Following up and keeping pace with the developments in the daily and poetic specializations of theory and practice, and the progress of the educational process.
3. Following up on the progress of lectures and the flow of instruction for lectures.

4. Developing plans to develop the school curriculum in line with the unified method.

Faculty Professional Development

1- Encourage new faculty members to engage in research groups and conduct scientific research.
2- Encourage the involvement of faculty members in training courses and development seminars.
3- Encourage new faculty members to participate in various community service activities (awareness of community issues) that are closely related.
4- Encouraging faculty members to exchange visits with the corresponding colleges in order to serve and enhance the academic process in spreading awareness about the importance of educational activities.
5- Encourage participation in activities related to continuing education.

12. Admission Criteria

According to the requirements of the Ministry of Higher Education and Scientific Research (Central Admission).

13. Key sources of information about the program

1- The curriculum approved by the Ministry of Higher Education and Scientific Research and its guidelines.
2- Decisions and recommendations of the scientific committees in the college and the physics department in particular
3- Development and rehabilitation courses in teaching methods. ·
4- Research on the Internet for similar experiments.
5- Personal experiences of leading professors in the college and department.
6- Department Page on the Website of the Faculty of Science/University of Basra
7- Department of Physics Directory

14. Program Development Plan

1- Communicate in curriculum development based on recent book releases and references.
2- Adopting modern interactive teaching methods. Activating twinning programs with international universities to learn about modern teaching curricula and methods and exchange experiences.
3- Developing future development plans through special committees for curricula and laboratories.
4- Encouraging cooperation and twinning with international universities, exchange of experiences and mutual visits.

Program Skills Outline

Learning Outcomes Required from the Program															
Evaluation				Skills				Knowledge				fundamental Or optional	Course Name	Course Code	Year/Level
C4	C3	C2	A1	B4	B3	B2	B1	A4	A3	A2	A1				
√	√	√	√	√	√	√	√	√	√	√	√	Essential	Principles of Mechanics	P101	First
√	√	√	√	√	√	√	√	√	√	√	√	Essential	Material Properties	P102	First
√	√	√	√	√	√	√	√	√	√	√	√	Essential	Electrical and magnetic	P103	First
√	√	√	√	√	√	√	√	√	√	√	√	Essential	Light	P104	First
√	√	√	√	√	√	√	√	√	√	√	√	Essential	Calculators (1)	A127	First
√	√	√	√	√	√	√	√	√	√	√	√	Essential		R101	First

√	√	√	√	√	√	√	√	√	√	√	√	**Essential**		R102	First First
√	√	√	√	√	√	√	√	√	√	√	√	**Essential**	Linear algebra	R129	
√	√	√	√		√	√	√	√	√	√	√	**Essential**	chemistry	K131	First
√	√	√	√		√	√	√	√	√	√	√	**Essential**	culture	W101	First
√	√	√	√		√	√	√	√	√	√	√	**Essential**	sport	S101	First
√	√	√	√		√	√	√	√	√	√	√	**Essential**	Arabic literature	D101	First
√	√	√	√		√	√	√	√	√	√	√	**Essential**	Analytical Mechanics	P201	The second
√	√	√	√		√	√	√	√	√	√	√	**Essential**	Electrical and magnetic	P203	The second
√	√	√	√		√	√	√	√	√	√	√	**Essential**	Light	P204	The second
√	√	√	√		√	√	√	√	√	√	√	**Essential**	Modern Physics	P207	The second
√	√	√	√		√	√	√	√	√	√	√	**Essential**	Principles of Electronics	P208	The second
√	√	√	√		√	√	√	√	√	√	√	**Essential**	Thermodynamics	P212	The second

√	√	√	√		√	√	√	√	√	√	√	**Essential**	Fundamentals of Geophysics	P227	The second
√	√	√	√		√	√	√	√	√	√	√	**Essential**		R201	The second
√	√	√	√		√	√	√	√	√	√	√	**Essential**		R214	The second
√	√	√	√		√	√	√	√	√	√	√	**Essential**	Calculators (2)	A260	The second
√	√	√	√		√	√	√	√	√	√	√	**Essential**	culture	W201	The second
√	√	√	√		√	√	√	√	√	√	√	**Essential**	Quantum Mechanics	P301	The third
√	√	√	√		√	√	√	√	√	√	√	**Essential**	Analytical Mechanics	P302	The third
√	√	√	√		√	√	√	√	√	√	√	**Essential**	Electromagnetism	P303	The third
√	√	√	√		√	√	√	√	√	√	√	**Essential**	Atomic physics	P307	The third
√	√	√	√		√	√	√	√	√	√	√	**Essential**	Electronics	P308	The third
√	√	√	√		√	√	√	√	√	√	√	**Essential**	Mathematical Physics	P315	The third

√	√	√	√		√	√	√	√	√	√	√	**Essential**	Astronomy	P326	The third
√	√	√	√		√	√	√	√	√	√	√	**Essential**	Calculators (3)	A327	The third
√	√	√	√		√	√	√	√	√	√	√	**Essential**	English literature	D301	The third
√	√	√	√		√	√	√	√	√	√	√	**elective**	Solar Energy	P309	The third
√	√	√	√	√	√	√	√	√	√	√	√	**elective**	Logic Circuits	P310	The third
√	√	√	√	√	√	√	√	√	√	√	√	**elective**	X-rays	P318	The third
√	√	√	√	√	√	√	√	√	√	√	√	**elective**	Reagents and detection methods	P321	The third
√	√	√	√	√	√	√	√	√	√	√	√	**elective**	Spectroscopy	P322	The third
√	√	√	√	√	√	√	√	√	√	√	√	**elective**	Relativity Theory	P342	The third
√	√	√	√	√	√	√	√	√	√	√	√	**Essential**	Quantum Mechanics	P401	Fourth
√	√	√	√	√	√	√	√	√	√	√	√	**Essential**	Research Project	P405	Fourth
√	√	√	√	√	√	√	√	√	√	√	√	**Essential**	Statistics	P409	Fourth

√	√	√	√	√	√	√	√	√	√	√	√	**Essential**	Laser	P413	Fourth
√	√	√	√	√	√	√	√	√	√	√	√	**Essential**	Advanced Athletic	P415	Fourth
√	√	√	√	√	√	√	√	√	√	√	√	**Essential**	Solid State	P427	Fourth
√	√	√	√	√	√	√	√	√	√	√	√	**Essential**	Calculators (4)	H460	Fourth
√	√	√	√	√	√	√	√	√	√	√	√	**Essential**	philosophy	Q400	Fourth
√	√	√	√	√	√	√	√	√	√	√	√	**elective**	Optical Devices	P412	Fourth
√	√	√	√	√	√	√	√	√	√	√	√	**elective**	Microwave	P420	Fourth
√	√	√	√	√	√	√	√	√	√	√	√	**elective**	Antennas	P421	Fourth
√	√	√	√	√	√	√	√	√	√	√	√	**elective**	Advanced Solid	P428	Fourth
√	√	√	√	√	√	√	√	√	√	√	√	**elective**	Thin Films	P429	Fourth
√	√	√	√	√	√	√	√	√	√	√	√	**elective**	Semiconductors	P430	Fourth
√	√	√	√	√	√	√	√	√	√	√	√	**elective**	Liquid crystals	P431	Fourth
√	√	√	√	√	√	√	√	√	√	√	√	**elective**	polymer	P432	Fourth

√	√	√	√	√	√	√	√	√	√	√	√	**elective**	Health Physics	P436	Fourth
√	√	√	√	√	√	√	√	√	√	√	√	**elective**	Molecular	P437	Fourth
√	√	√	√	√	√	√	√	√	√	√	√	**elective**	Nano	P457	Fourth

Level I Principles of Mechanics P 101

Course Description Form

Course Description

The study of the behavior of particles whose speed is less than the speed of light, i.e. the description of the physical properties of objects, and the study is divided into two parts.	
University of Basra – College of Science **displacement, and acceleration, and this part is within what is called kinesiology.2- The**	1. Educational Institution
Physics **causes through the study of Newton's laws and the laws**	2. Scientific Department/Center
Principles of Mechanics P 101	3. Course Name/Code
Bachelor, Master, PhD	4. Programs in which he enters
weekly	5. Available Forms of Attendance
2024-2025	6. Semester/Year
60 Credit Hours	7. Number of Hours (Total)
1-9-2024	8. Date this description was prepared
9. Course Objectives	

1- The study of motion by studying its properties such as speed, displacement, and acceleration, and this part is within what is called kinesiology.2- The study of the causes

10.Course Outcomes, Teaching, Learning and Assessment Methods

Newton's laws and the laws of conservation of energy and momentum, and this part of

[1]A. Cognitive Objectives

- ✓ **Introduce the student to an introduction to the principles of classical mechanics**
- ✓ **The study of motion by studying its properties such as speed, displacement, and acceleration, and this part is part of what is called kinesiology.**
- ✓ **The study of the causes of motion, i.e. the study of the relationship between motion and its causes by studying Newton's laws and the laws of conservation of energy and momentum, and this part of the study falls within the so-called dynamics.**

b. Skill objectives of the course.

B2 - Inference of movement by studying its properties

Teaching and Learning Methods

1. Theoretical lectures and discussions.

2. Use of educational aids (presentations and scientific films)

Evaluation Methods

1. Daily tests and laboratory reports

2. Monthly Tests

3. Final Exams

C. Emotional and Values Goals

A1- The ability to communicate information after presenting, discussing and interpreting it

C2- Linking theoretical information with the practical aspect

Teaching and Learning Methods

1. Direct explanation and presentation of lectures.

2- **Powerpoint presentation** and screen.

Evaluation Methods

1. Daily tests and laboratory reports

2. Monthly Tests

3. Final Exams

d. Transferred general and qualifying skills (other skills related to employability and personal development).

1- Developing the student's mental abilities

2 - Understanding Mechanical Processes

Identify the principle of movement and study its properties

11. Course Structure					
Evaluation Method	Teaching Method	Module Name / or Subject	Required Learning Outcomes	Hours	The week
Daily and monthly tests	Theoretical + Practical	**Vector**	The student's understanding of the lesson	3N + 3 P per week	**The first** **The second** **And the third**
Daily and monthly tests	Theoretical + Practical	**Kinesiology** **Location Vector and Displacement Vector, Instantaneous Speed and Speed Rate, Instantaneous Acceleration Rate and Acceleration**	The student's understanding of the lesson	3N + 3 P per week	**Fourth Fifth** **and the sixth**
Daily and monthly tests	Theoretical + Practical	**Semester Exam** **Motion in one dimension (equations of motion), an example of this is free fall.**	The student's understanding of the lesson	3N + 3 P per week	**Seventh and eighth**
Daily and monthly tests	Theoretical +	**Motion in two dimensions, displacement vector, rate of velocity and**	The student's understanding of the lesson	3N + 3 P per week	**Ninth & Tenth**

	Practical	**instantaneous velocity., rate of acceleration and instantaneous acceleration**			
Daily and monthly tests	Theoretical + Practical	**Equations of motion in two dimensions, projectile motion**	The student's understanding of the lesson	3N + 3 P per week	**Eleventh and the twelfth**
Daily and monthly tests	Theoretical + Practical	**Second Semester Exam**	The student's understanding of the lesson	3N + 3 P per week	**Thirteenth**
Daily and monthly tests	Theoretical + Practical	**Newton's laws of motion**	The student's understanding of the lesson	3N + 3 P per week	**Fourteenth and fifteenth**

12.Infrastructure

	1 Required Textbooks
1- Physics for scientists and engineers with modern physics, Douglas C. Giancoli, 4th edition, 2014. 2- Fundamentals of physics, Halliday, Resnick and Walker, 10th edition, 2018	2 Main References (Sources)

Community College. 2010	
	Recommended books and references (scientific journals, reports,....)
	in Electronic References, Websites ....

13.Course Development Plan
Communicate in the development of the curriculum based on recent versions of books and references. And the adoption of modern interactive means of education. Activating matching programs with international universities to learn about modern curricula and teaching methods and exchange experiences.

Level II Electrical and Magnetic P 203

Course Description Form

Course Description

The course description focuses on magnetic fields and their relationship to	
University of Basra – College of Science	10. Educational Institution
Calculating the magnetic fields arising from constant electric current and	
Physics	11. Scientific Department/Center
their applications to circuits through the Bayot Sf	
Electrical and Magnetic P203	12. Course Name/Code
magnetic induction extensively, studying the tran (resistive-amplitude) and resistive-induction-expanding circuits) and knowing	
Bachelor, Master, PhD .	13. Programs in which he enters
weekly	14. Available Forms of Attendance
2024-2025	15. Semester/Year
60 Credit Hours	16. Number of Hours (Total)
1-9-2024	17. Date this description was prepared
18. Course Objectives	

14.Course Outcomes, Teaching, Learning and Assessment Methods

A. Cognitive Objectives

1- The concept of magnetic fields and their relationship to electric fields and the methods of detecting magnetic fields and the movement of electrically charged charges and objects within the magnetic fields are studied, thus calculating the magnetic

2- Calculation of magnetic fields arising from continuous electric current and their applications to circuits through Paint-Severt's law and Ampere's law.

- **Calculation of magnetic fields arising from constant electric current and their applications to circuits through the law of Bayot-Severt and the study of magnetic induction in an extensive**

3- Studying magnetic induction extensively through Faraday's law and Lenz's law-augmented by applications to know the induced electric motive force and the induced electric current as a result of the movement of a circuit without sources within a magnetic field or the passage of a magnetic field that cuts through this circuit.

- **Studying the transient currents in circuits (resistive-wide) and circuits (resistant-amplitude circuits and knowing the growth and decay of current in them.**

4- Studying the transient currents in circuits (resistive-wide) and circuits (resistant-

b. Skill objectives of the course.

1 . Inference of the calculation of magnetic fields arising from constant electric current and their applications to circuits through the law of Bayot-Svart and the law of Ampere.and magnetic induction and transient currents in electronic rotors.

Teaching and Learning Methods

1. Theoretical lectures and discussions.

2. Use of educational aids (presentations and scientific films)

Evaluation Methods

1. Daily tests and laboratory reports

2. Monthly Tests

3. Final Exams

C. Emotional and Values Goals A1- The ability to communicate information after presenting, discussing and interpreting it A2- Linking the theoretical information to the practical part and experimenting with it.
Teaching and Learning Methods
1. Explaining and delivering direct lectures on theory and practice. 2- **Powerpoint presentation** and screen.
Evaluation Methods
1. Daily tests and laboratory reports 2. Monthly Tests 3. Final Exams
d. Transferred general and qualifying skills (other skills related to employability and personal development). 1- Developing the student's mental abilities 2- Understanding the electric and magnetic fields in order to apply them

15. Course Structure

Evaluation Method	Teaching Method	Module Name / or Subject	Required Learning Outcomes	Hours	The week
Daily and monthly tests	Theoretical + Practical	**Magnetic field**	The student's understanding of the lesson	3 N + 3 p per week	**The first The second And the third**
Daily and monthly tests	Theoretical + Practical	**Magnetic Field of Constant Electric Current**	The student's understanding of the lesson	3 N + 3 p per week	**Fourth Fifth and the sixth**
Daily and monthly tests	Theoretical + Practical	**Electromagnetic Induction**	The student's understanding of the lesson	3 N + 3 p per week	**Seventh and eighth**
Daily and monthly tests	Theoretical + Practical	**Electromagnetic Induction**	The student's understanding of the lesson	3 N + 3 p per week	**Ninth & Tenth**
Daily and monthly tests	Theoretical +	**Electromagnetic Induction + Iraqi Army Founding Day**	The student's understanding of the lesson	3 N + 3 p per week	**Eleventh**

	Practical				**and the twelfth**
Daily and monthly tests	Theoretical + Practical	**Second Semester Exam**	The student's understanding of the lesson	3 N + 3 p per week	**Thirteenth**
Daily and monthly tests	Theoretical + Practical	**Transient Circuits**	The student's understanding of the lesson	3 N + 3 p per week	**Fourteenth and fifteenth**

16.Infrastructure

	1 Required Textbooks
[1] Foundations of Electrical and Magnetic, D . Dr Rashid Abdul Razzaq Al , Rashid . Nazem Hassoun al-Attar [2] Fundamentals of Electricity and Magnetism, Yahya Abdel Hamid. [3] Electricity and Magnetism, Ibrahim Nasser Ibrahim.	2 Main References (Sources)
	Recommended books and references (scientific journals, reports,....)

	in Electronic References, Websites ....

17.Course Development Plan
Communicate in the development of the curriculum based on recent versions of books and references. And the adoption of modern interactive means of education. Activating matching programs with international universities to learn about modern curricula and teaching methods and exchange experiences.

Second Level Analytical Mechanics P 201

Course Description Form

Course Description

Analytical mechanics is a subfield of mathematical physics that uses analysis techniques, in particular the calculation of changes, to solve problems in mechanics. As a result, instead of solving equations in vector quantities, they involve solutions to differential equations for numerical quantities.	
University of Basra – College of Science	19. Educational Institution
Physics	20. Scientific Department/Center
Analytical Mechanics P 201	21. Course Name/Code
Bachelor, Master, PhD	22. Programs in which he enters
weekly	23. Available Forms of Attendance
2024-2025	24. Semester/Year
30 Credit Hours	25. Number of Hours (Total)
1-9-2024	26. Date this description was prepared
27. Course Objectives	

The course aims to introduce students to the motion of dynamic systems that are usually described in terms of two basic quantities: volumes and vectors. A vector is the r-location vector of a moving particle and the parameter is time t, the derivative of r relative to t is called velocity v, and the time derivative of velocity is called acceleration a. Isaac Newton's three laws describe the fundamental laws of motion, a depressed harmonic oscillator. Explain the motion of charged particles in the electric and magnetic field. Newton officially proclaimed the law of general gravitation in the Book of Principles. To prove Kepler's first law, the differential equation of the particle's orbit in any central force field is available. Explain the center of mass and linear momentum of the system. I decided to use it as basic Lagrangian equations and Hamilton's equations. Rotation of a solid object around an arbitrary axis: moments and products of angular momentum, inertia, and kinetic energy.

18.Course Outcomes, Teaching, Learning and Assessment Methods

A. Cognitive Objectives

- ✓ **Introduce students to the motion of dynamic systems that are usually described in terms of two basic quantities: volumes and vectors.**
- ✓ **The student introduces Newton 's three fundamental laws of motion, a suppressed harmonic oscillator.**
- ✓ **Explain the motion of charged particles in the electric and magnetic field.**

Prove Kepler's first law, the differential equation of the orbit of a particle in any central force field

b. Skill objectives of the course. B1 – Inference the description of dynamic systems and the explanation of the motion of particles using basic theories and hypotheses
Teaching and Learning Methods
1. Theoretical lectures and discussions. 2. Use of educational aids (presentations and scientific films)
Evaluation Methods
1. Daily Tests 2. Monthly Tests 3. Final Exams
C. Emotional and Values Goals A1- The ability to communicate information after presenting, discussing and interpreting it C2- Linking the information given to the applied forms
Teaching and Learning Methods
1. Direct explanation and presentation of lectures. 2- **Powerpoint presentation** and screen.

Evaluation Methods
1. Daily tests and laboratory reports 2. Monthly Tests 3. Final Exams
d. Transferred general and qualifying skills (other skills related to employability and personal development). -D1- Developing the student's mental abilities D2 Understanding and Evolution of Dynamic Systems.

19. Course Structure

Evaluation Method	Teaching Method	Module Name / or Subject	Required Learning Outcomes	Hours	The week
Daily and monthly tests	theoretical	**Lacrange Mechanics + Coordinates to Determine + Lagrange Equations of Motion for**	The student's understanding of the lesson	2 N	**The first** **The second**

		Conservatism Systems			**And the third**
Daily and monthly tests	theoretical	**Constraint Forces: Lagrange Rackets** **+ The D'Alembert Principle: Generalized Power** **Potential Energy and Balance: Stability**	The student's understanding of the lesson	2 N	**Fourth Fifth** **and the sixth**
Daily and monthly tests	theoretical	**Semester Exam** **Theoretical Aspect** **Dual harmonic oscillators: normal coordinates**	The student's understanding of the lesson	2 N	**Seventh and eighth**
Daily and monthly tests	theoretical	**Vibration SystemsContinuous Wave: Wave Equation** **Introduction: Center of Mass and Linear Momentum of the System**	The student's understanding of the lesson	2 N	**Ninth & Tenth**

Daily and monthly tests	theoretical	**Collisions** **+ Iraqi Army Founding Day**	The student's understanding of the lesson	2 N	**Eleventh** **and the twelfth**
Daily and monthly tests	theoretical	**Second Semester Exam**	The student's understanding of the lesson	2 N	**Thirteenth**
Daily and monthly tests	theoretical	**Center of mass of solid body + rotation of a solid object around the fixed axis: moment of inertia**	The student's understanding of the lesson	2 N	**Fourteenth** **and fifteenth**

20.Infrastructure

	1 Required Textbooks
1] Analytical Mechanics, 7ed, by G. Fowles & G. Cassiday [2] Theoretical Physics 2 (Analytical Mechanics), by Wolfgang Nolting	2 Main References (Sources)
	Recommended books and references (scientific journals, reports,....)

	in Electronic References, Websites ....

21.Course Development Plan
Communicate in the development of the curriculum based on recent versions of books and references. And the adoption of modern interactive means of education. Activating matching programs with international universities to learn about modern curricula and teaching methods and exchange experiences.

Course Description Form for the Academic Year 2024-2025

Course Description / Baath Party Crimes

This course description provides a necessary summary of the most important characteristics of the course and the learning outcomes expected of the student to achieve if he or she has made the most of the available learning opportunities. It must be linked to the description of the program

University of Basra	1- Educational Institution
bioscience	2- Scientific Department/Center
Baath Party Crimes	3- Course Name/Code
Mandatory	4- Available Forms of Attendance
First 2023	5- Chapter/Year
Four hours	6- Number of Hours (Total)
	7- Date of preparation of this description

Course Objectives

1- Introducing the student to the concept of crimes and the most important types of international crimes

2- Knowing the crimes committed by the Baath regime during its rule.

3- Introduce the student to the nature of the general situation and its developments during that period.

4- Knowing the negative and positive effects left by the Baath regime.

Required Program Outcomes and Teaching, Learning and Assessment Methods
A- Cognitive Objectives **The possibility of defining the concept of crimes, the most important sciences that dealt with it, and the types of international crimes.**
B- Skill Objectives of the Course **Lectures on the core of the topic, comparing the systems established in the curriculum with the current international systems, and giving life examples and linking them with the scientific material.**
Teaching and Learning Methods **1. Allowing students to express their opinion on those crimes and the general conditions at that time.** **2- Preparing the lecture through questions and answers.**
Evaluation Methods **1- Daily exams (jugs)** **2- Monthly exams with two exams per course** **3- Monitor students' interaction and answer questions during the lecture** **4- Student attendance, commitment and behavior**

Level II Physical Optics P 204

Course Description Form

Course Description

Teach students the principles, theoretical foundations, and practical	
University of Basra – College of Science	28. Educational Institution
and then the phenomena of interference, diffraction and polarization of light	
Physics	29. Scientific Department/Center
Physical Optics P 204	30. Course Name/Code
Bachelor, Master, PhD	31. Programs in which he enters
weekly	32. Available Forms of Attendance
2024-2025	33. Semester/Year
60 Credit Hours	34. Number of Hours (Total)
1-9-2024	35. Date this description was prepared
36. Course Objectives	

Teach students the principles, theoretical foundations, and practical applications of physical optics related to wave motion, wave superposition, and then the phenomena of

22.Course Outcomes, Teaching, Learning and Assessment Methods

A. Cognitive Objectives

- ✓ **The student will introduce the visual phenomena of interference, diffraction and polarization of light.**

Knowledge of the principles, theoretical foundations and practical applications of physical optics related to wave motion and wave superposition

b. Skill objectives of the course.

B1 – Acquire the skill of comparing visual phenomena

Teaching and Learning Methods

1. Theoretical lectures and discussions.

2. Use of educational aids (presentations and scientific films)

Evaluation Methods

1. Daily tests and laboratory reports

2. Monthly Tests

3. Final Exams

C. Emotional and Values Goals

A1- The ability to communicate information after presenting, discussing and interpreting it

A2- Linking information , its application , and the extent to which it affects our lives and benefiting from it.

Teaching and Learning Methods

1. Direct explanation and presentation of practical and theoretical lectures.

2- **Powerpoint presentation** and screen.

Evaluation Methods

1. Daily tests and laboratory reports

2. Monthly Tests

3. Final Exams

d. Transferred general and qualifying skills (other skills related to employability and personal development).

1- Developing the student's mental abilities

2. Development and practical applications of physical optics related to wave motion and wave superposition

23. Course Structure					
Evaluation Method	Teaching Method	Module Name / or Subject	Required Learning Outcomes	Hours	The week
Daily and monthly tests	Theoretical + Practical	**Wave Equation** **Wave equation and the principle of wave superposition** **Wave Superposition Principle**	The student's understanding of the lesson	3 N + 3 P per week	**The first** **The second** **And the third**
Daily and monthly tests	Theoretical + Practical	**Light interference** **Wave Front Splitters**	The student's understanding of the lesson	3 N + 3 P per week	**Fourth Fifth** **and the sixth**
Daily and monthly tests	Theoretical + Practical	**Wavelength Splitters** **Multibeam Overlap**	The student's understanding of the lesson	3 N + 3 P per week	**Seventh and eighth**

Daily and monthly tests	Theoretical + Practical	**Diffraction** **Fränhofer Haywood**	The student's understanding of the lesson	3 N + 3 P per week	**Ninth & Tenth**
Daily and monthly tests	Theoretical + Practical	**Fresnel diffraction** **Polarization**	The student's understanding of the lesson	3 N + 3 P per week	**Eleventh** **and the twelfth**
Daily and monthly tests	Theoretical + Practical	**Second Semester Exam**	The student's understanding of the lesson	3 N + 3 P per week	**Thirteenth**
Daily and monthly tests	Theoretical + Practical	**Methods of Attraction+** **Mathematical representation of polarized light and polarizers**	The student's understanding of the lesson	3 N + 3 P per week	**Fourteenth** **and fifteenth**
24.Infrastructure					
			1 Required Textbooks		

[1] Introduction to Optics, *F.J. Pedrotti, L.M. Pedrotti* and *L.S. Pedrotti*, 3rd ed., 2007. [2] Optics, *Eugene Hecht*, 5th ed., 2017. ed., 2010. (Translation: Dr. Mohamed Abdel Hamid Darwish + Dr. Ali Abdel Hamid Darwish) [3] FUNDAMENTAL OF OPTICS, Francis A. JENKINS and Harvey E.WHITE, 4th ed., 2001. Part, 2 (Translation: Dr. Abdel Fattah El-Shazly + Dr. Saeed Al-Jaziri)	2 Main References (Sources)
	Recommended books and references (scientific journals, reports,....)
	in Electronic References, Websites ....

25.Course Development Plan
Communicate in the development of the curriculum based on recent versions of books and references. And the adoption of modern interactive means of education. Activating matching programs with international universities to learn about modern curricula and teaching methods and exchange experiences.

Level II Physical Optics P 204

Course Description Form

Course Description

Teach students the principles, theoretical foundations, and practical	
University of Basra – College of Science	37. Educational Institution
and then the phenomena of interference, diffraction and polarization of light	
Physics	38. Scientific Department/Center
Physical Optics P 204	39. Course Name/Code
Bachelor, Master, PhD	40. Programs in which he enters
weekly	41. Available Forms of Attendance
2024-2025	42. Semester/Year
60 Credit Hours	43. Number of Hours (Total)
1-9-2024	44. Date this description was prepared
45. Course Objectives	

Teach students the principles, theoretical foundations, and practical applications of physical optics related to wave motion, wave superposition, and then the phenomena of

26.Course Outcomes, Teaching, Learning and Assessment Methods

A. Cognitive Objectives

- ✓ **The student will introduce the visual phenomena of interference, diffraction and polarization of light.**

Knowledge of the principles, theoretical foundations and practical applications of physical optics related to wave motion and wave superposition

b. Skill objectives of the course.

B1 – Acquire the skill of comparing visual phenomena

Teaching and Learning Methods

1. Theoretical lectures and discussions.

2. Use of educational aids (presentations and scientific films)

Evaluation Methods

1. Daily tests and laboratory reports

2. Monthly Tests

3. Final Exams

C. Emotional and Values Goals

A1- The ability to communicate information after presenting, discussing and interpreting it

A2- Linking information , its application , and the extent to which it affects our lives and benefiting from it.

Teaching and Learning Methods

1. Direct explanation and presentation of practical and theoretical lectures.

2- **Powerpoint presentation** and screen.

Evaluation Methods

1. Daily tests and laboratory reports

2. Monthly Tests

3. Final Exams

d. Transferred general and qualifying skills (other skills related to employability and personal development).

1- Developing the student's mental abilities

2. Development and practical applications of physical optics related to wave motion and wave superposition

27. Course Structure					
Evaluation Method	Teaching Method	Module Name / or Subject	Required Learning Outcomes	Hours	The week
Daily and monthly tests	Theoretical + Practical	**Wave Equation** **Wave equation and the principle of wave superposition** **Wave Superposition Principle**	The student's understanding of the lesson	3 N + 3 P per week	**The first** **The second** **And the third**
Daily and monthly tests	Theoretical + Practical	**Light interference** **Wave Front Splitters**	The student's understanding of the lesson	3 N + 3 P per week	**Fourth Fifth** **and the sixth**
Daily and monthly tests	Theoretical + Practical	**Wavelength Splitters** **Multibeam Overlap**	The student's understanding of the lesson	3 N + 3 P per week	**Seventh and eighth**

Daily and monthly tests	Theoretical + Practical	**Diffraction** **Fränhofer Haywood**	The student's understanding of the lesson	3 N + 3 P per week	**Ninth & Tenth**
Daily and monthly tests	Theoretical + Practical	**Fresnel diffraction** **Polarization**	The student's understanding of the lesson	3 N + 3 P per week	**Eleventh** **and the twelfth**
Daily and monthly tests	Theoretical + Practical	**Second Semester Exam**	The student's understanding of the lesson	3 N + 3 P per week	**Thirteenth**
Daily and monthly tests	Theoretical + Practical	**Methods of Attraction+** **Mathematical representation of polarized light and polarizers**	The student's understanding of the lesson	3 N + 3 P per week	**Fourteenth** **and fifteenth**
28.Infrastructure					
			1 Required Textbooks		

[1] Introduction to Optics, *F.J. Pedrotti, L.M. Pedrotti* and *L.S. Pedrotti*, 3rd ed., 2007. [2] Optics, *Eugene Hecht*, 5th ed., 2017. ed., 2010. (Translation: Dr. Mohamed Abdel Hamid Darwish + Dr. Ali Abdel Hamid Darwish) [3] FUNDAMENTAL OF OPTICS, Francis A. JENKINS and Harvey E.WHITE, 4th ed., 2001. Part, 2 (Translation: Dr. Abdel Fattah El-Shazly + Dr. Saeed Al-Jaziri)	2 Main References (Sources)
	Recommended books and references (scientific journals, reports,....)
	in Electronic References, Websites ....

29.Course Development Plan
Communicate in the development of the curriculum based on recent versions of books and references. And the adoption of modern interactive means of education. Activating matching programs with international universities to learn about modern curricula and teaching methods and exchange experiences

Second Level Thermodynamics F212

Course Description Form

Course Description

This course description provides a brief summary of the most important	
University of Basra – College of Science	46. Educational Institution
student to achieve and demonstrate whether they have made the most of the	
Physics	47. Scientific Department/Center
available learning opportunities. It should description	
Thermodynamics	48. Course Name/Code
Bachelor	49. Programs in which he enters
weekly	50. Available Forms of Attendance
2024-2025	51. Semester/Year
45 Credit Hours	52. Number of Hours (Total)
1-9-2024	53. Date this description was prepared
54. Course Objectives	

It is concerned with the study of energy and its transformations, as well as the study of the analysis of the properties of a substance that is affected by temperature change .

30.Course Outcomes, Teaching, Learning and Assessment Methods

A. Cognitive Objectives

- ✓ **Introduce the student to an introduction to thermodynamics and thermodynamic processes.**

b. Skill objectives of the course.

B1 – Acquire the skill of knowing thermodynamic processes.

Teaching and Learning Methods

1. Theoretical lectures and discussions.
2. Use of educational aids (presentations and scientific films)

Evaluation Methods

1. Daily tests and laboratory reports
2. Monthly Tests
3. Final Exams

C. Emotional and Values Goals A1- The ability to communicate information after presenting, discussing and interpreting it
Teaching and Learning Methods
1. Direct explanation and presentation of lectures. 2- **Powerpoint presentation** and screen.
Evaluation Methods
1. Daily tests and laboratory reports 2. Monthly Tests 3. Final Exams
d. Transferred general and qualifying skills (other skills related to employability and personal development). -D1- Developing the student's mental abilities

31. Course Structure					
Evaluation Method	Teaching Method	Module Name / or Subject	Required Learning Outcomes	Hours	The week
Daily and monthly tests	theoretical	**Theoretical Aspect** **Chapter One / Basic Concepts in Thermodynamics** **Chapter Two / Temperature (Temperature - Temperature Gauges - Triple Point of Water)**	The student's understanding of the lesson	3 N	**The first** **The second** **And the third**
Daily and monthly tests	theoretical	**Theoretical Aspect** **Chapter Three: Methods of Heat Transfer** **3.1 Specific heat (specific heat capacity)** **3.2 Latent heat** **3.3 Heat Transfer by Plugging** **3.4 Heat transfer by pregnancy**	The student's understanding of the lesson	3 N	**Fourth Fifth** **and the sixth**

		3.5 Heat transfer by radiation **3.6 Teuten's Law of Cooling** **Chapter Four: Equation of the Case** **4.1 Introduction** **4.2 Empirical case equation** **4.3 Qualities of the ideal gas** **4.5 Laws of Gases** **4.6 State Equation for True Gases**			
Daily and monthly tests	theoretical	**Semester Exam** **Theoretical Aspect** **Solving Chapter II and III Issues** **First, Second and Third Semester Exam**	The student's understanding of the lesson	3 N	**Seventh and eighth**
Daily and monthly tests	theoretical	**Theoretical Aspect** **Chapter Five: Labor** **5.1 Introduction**	The student's understanding of the lesson	3 N	**Ninth & Tenth**

		5.2 Thermodynamic Process **1- Reverse processes** **2- Non-reversible processes** **3- Isothermic processes** **5.3 Calculation of Thermodynamics Occupancy** **5.4 Solving the Equation of the Workpiece** **5.5 Dependence of the workpiece on the course of the process** **Work in the thermodynamic processes of the ideal gas** **1- Isothermic reversibility process**			
Daily and monthly tests	theoretical	**Theoretical Aspect** **2- Isothermal reversibility process with constant pressure**	The student's understanding of the lesson	3 N	**Eleventh** **and the twelfth**

		3- Fixed-size isothermal reversibility process **4. Free Expansion Process** **5.7 Coefficients of volumetric expansion and compression** **8.5 Workpiece in terms of volumetric expansion coefficient and compression coefficient** **5.9 Workpieces for Solid and Liquid Materials** **5.10 Equation of the state for non-gaseous substances** **5.11 Complete and incomplete calculus**			
Daily and monthly tests	theoretical	**Second Semester Exam**	The student's understanding of the lesson	3 N	**Thirteenth**
Daily and monthly tests	theoretical	**Theoretical Aspect** **Chapter Six: The First Law of Thermodynamics**	The student's understanding of the lesson	3 N	**Fourteenth**

		6.1 Introduction **6.2 Formula of the first law in the thermodynamics of the ideal gas** **1- The First Law of Isoparic Process (Changes in the Amount of Heat under Constant Pressure)** **2- The first law of isometric process (changes in the amount of heat under a constant volume)** **3- The first law of isothermal process (changes in the amount of heat under constant temperature)** **6.3 Specific Heat Capacitance (C**			**and fifteenth**
32.Infrastructure					
			1 Required Textbooks		

Heat and thermodynamics	2 Main References (Sources)
	Recommended books and references (scientific journals, reports,....)
	in Electronic References, Websites ....

33.Course Development Plan
Communicate in the development of the curriculum based on recent versions of books and references. And the adoption of modern interactive means of education. Activating matching programs with international universities to learn about modern curricula and teaching methods and exchange experiences.

Level II Geophysics F227

Course Description Form

Course Description

This course description provides a brief summary of the most important	
University of Basra – College of Science	55. Educational Institution
student to achieve and demonstrate whether they have made the most of the	
Physics	56. Scientific Department/Center
available learning opportunities. It should description	
Geophysics F227	57. Course Name/Code
Bachelor	58. Programs in which he enters
weekly	59. Available Forms of Attendance
2024-2025	60. Semester/Year
30 Credit Hours	61. Number of Hours (Total)
1-9-2024	62. Date this description was prepared
63. Course Objectives	

The student's ability to recognize physical applications in geological exploration

34.Course Outcomes, Teaching, Learning and Assessment Methods

A. Cognitive Objectives

- ✓ **Introduce the student to an introduction to the physical components of the earth, the earth's mantles and layers, and the emergence of the earth's surface.**
- ✓ **Introduce the student to the geophysical processes that occur in the Earth's interior and their effects on the Earth's surface**
- ✓ **Introduce the student to the most important safety conditions and the initial procedures followed when natural disasters occur**

b. Skill objectives of the course.

B1 – Acquire the skill of diagnosing geological hazards.

B2 - Inferring the methods of safety and protection of the ecosystem by knowing the safety and prevention measures followed during the occurrence of disasters

Teaching and Learning Methods

1. Theoretical lectures and discussions.

2. Use of educational aids (presentations and scientific films)

Evaluation Methods

1. Daily tests and laboratory reports

2. Monthly Tests 3. Final Exams
C. Emotional and Values Goals A1- The ability to communicate information after presenting, discussing and interpreting it C2- Linking information to the environmental reality and the land system and the extent of its impact on different neighborhoods
Teaching and Learning Methods
1. Direct explanation and presentation of lectures. 2- **Powerpoint presentation** and screen.
Evaluation Methods
1. Daily tests and laboratory reports 2. Monthly Tests 3. Final Exams
d. Transferred general and qualifying skills (other skills related to employability and personal development). -D1- Developing the student's mental abilities

D2 Understanding Underground and Surface Geophysical Processes

Identifying geological hazards and their impact on the biosphere

35. Course Structure

Evaluation Method	Teaching Method	Module Name / or Subject	Required Learning Outcomes	Hours	The week
Daily and monthly tests	theoretical	**Theoretical Aspect** **Chapter 1** **Introduction to the subsoil and the main parts and components** **Thermodynamic Theory** **Chapter 2: Geophysics Methods in Geology, Seismic Methods**	The student's understanding of the lesson	2 N	**The first** **The second** **And the third**
Daily and monthly tests	theoretical	**Theoretical Aspect** **Primary Waves, Secondary Waves, and Riley Wolf Waves** **Basic Principles of Wave Conduction, Stress and Adaptability, Elasticity Constants and Their Relationship to**	The student's understanding of the lesson	2 N	**Fourth Fifth** **and the sixth**

		Elastic Wave Velocity **Semester Exam**			
Daily and monthly tests	theoretical	**Theoretical Aspect** **Principles of seismic mapping, types of earthquakes** **Propagation of seismic waves between different layers, reflective and refractive methods**	The student's understanding of the lesson	2 N	**Seventh and eighth**
Daily and monthly tests	theoretical	**Theoretical Aspect** **Chapter 3: The Attraction Method** **Chapter 4: The Electrical Method**	The student's understanding of the lesson	2 N	**Ninth & Tenth**
Daily and monthly tests	theoretical	**Theoretical Aspect** **discussion** **Chapter 5: The Magnetic Method**	The student's understanding of the lesson	2 N	**Eleventh** **and the twelfth**
Daily and monthly tests	theoretical	**Second Semester Exam**	The student's understanding of the lesson	2 N	**Thirteenth**

Daily and monthly tests	theoretical	**Theoretical Aspect** **Review and Discussion**	The student's understanding of the lesson	2 N	**Fourteenth** **and fifteenth**

36.Infrastructure	
	1 Required Textbooks
1- Hamblin, W.K, Ghrstiansen, E,H, 1998, (Earth Dynamic System). Prentic Hall, New jersey, Eight Edition. 2- John Milson, 2003, Field Gophysics, John wiley and sons, third Edition. 3- El-Arabi ,H, Shendi,2007, Introduction of geophysics, 4- Boris Khesin, 2005, PHYSICAL METHODS AND APPROACHES IN ENVIRONMENTAL STUDIES	2 Main References (Sources)
	Recommended books and references (scientific journals, reports,....)
	in Electronic References, Websites ....

37.Course Development Plan

Communicate in the development of the curriculum based on recent versions of books and references.

And the adoption of modern interactive means of education.

Activating matching programs with international universities to learn about modern curricula and teaching methods and exchange experiences.

Curriculum Vocabulary: < VC++ programming>

Teaching Name : Assoc. Prof. Dr. Mohamed Mohsen Ali Al-Kazkouz **MOBILE NUMBER : +964 7802179823**

Affiliation : Faculty of Science/Department of Physics Number of Units of Lesson : 3

Official Email: mohammad.mohsein@uobasrah.ed.iq **Link to the official page** faculty.uobasrah.edu.iq/faculty/2229 **:**

Overview

The course aims to introduce the student to programming in VC++.

Goals and Objectives

Objectives of Programming in VC++1- The main objective of this course is to introduce the student to the basics of building different programs using the VC++ language on the basis of building an integrated structure to build different applications that can be used in different computer specializations.2- Explain how the computer deals with the programming language and how it organizes variables and programming commands and organizes them in memory devices.3- Developing students' skills in dealing with computers through the application of different programs that clarify the programming structure.4- Teaching the student the importance of the computer in the present and the future and the extent of its progress. The pace of development in this field and how to keep pace with it. 5- Making the student acquire practical skills to apply programs in VC++. 6- VC++ language applications: A- Desktop application programming: It has been widely used in building operating systems such as (Windows 95/98 and UNIX operating system), B- Artificial intelligence applications, C- Robotics/Arduino: The robot's electronic brain can be worked by C++, especially in the Arduino board.D- Game programming: C++ can be used to program very powerful games with Unreal Engines, etc.

- ✓
- ✓

Sources

[1] Elixir in Language C++, by Sultan Muhammad

[2] C++ The Quick Guide, translated and written by Bassel Al-Ramo and Samir Ezzo

[3]

Approved Assessments

The grade of the course (100 grade value) depends on the following aspects:

Grade	Details
Final Exam (40), Practical Final Exam (20), Monthly Exams (27)	**Exams**
1	**Degree of assimilation**

1	**Share**
1	**Attendance**
10	**Duties**

Lesson Description and Customization Schedule

The course includes (3) hours - the number of weekly hours for the course is two hours distributed over 15 weeks and 3 laboratory hours.

Exams and Assessments	Reading at the source	Subject	Dating	Week
Assignment 1	In this chapter, we explain how to use the C++ program and the general body of the program, as well as the symbols used, words, and names and the rules for naming them, and the representation of constants in this language. We also show how to define numerical variables and literal variables and how to assign values to them in the program. We also discuss the tools (effects) used in the C++ language.	Introduction to C++	2023/9/28	1
Assignment 2	In this part of the chapter, we show how to use numerical variables in arithmetic, relational (comparison), equivalence, as well as logical operations and their impact on the program and its results. In the last part of this chapter, we show how to deal with the coefficients represented by the interrogation coefficient, the comma coefficient, and the correct subtraction coefficient. of the types of numerical and symbolic variables and how important it is in influencing the size of memory. In the last part of this chapter, we explain the primacy of operations and the output and input entity and their use in C++ programs.	Introduction to VC++	2023/10/5	2
Duty 3	In this chapter, we learn how to express many mathematical functions and use them in simple and complex operations to reduce the difficulty of those operations. We also discuss the use of constants and the process of defining them to reduce the number and size of the program's steps. We also touch on the sentences of decision making and their great importance in reaching the goal required of the program with high accuracy and with fewer steps, and we also show the importance of using the optional sentence and its wide use in many life and academic applications such as the exam committee program.	Desk (mathematical) functions, constants, decision sentences, and optional sentences	2023/10/12	3
Duty 4	In this chapter, we explain the importance of cumulative addition and how to use it in jumping sentences and repetition loops, which has a great impact on reducing the steps of the program and its impact on mathematical operations. We also discuss the types of repeat loops and their importance in solving many mathematical equations and complex sequences.	Cumulative Addition, Jump Clause, Recursive Loops (Rotors)	2023/10/19	4

Duty 5	In this part of the chapter, we discuss the use of overlapping loops and their importance in many simple and complex mathematical and physical applications, as well as their use in the output of different shapes and their importance later in matrices and functions of different types. This chapter also deals with the sentences of suspension and continuity and their importance in reducing the repetition of steps in implementation.	Overlapping (multiplication) recurring loops, pause and continuation sentences	2023/10/26	5
First Monthly Exam			2023/11/2	6
Duty 6	In this chapter, we will discuss the definition of matrices, their declarations, and their types (one-dimensional matrices and two-dimensional matrices), as well as how to determine the values of the matrix and its role in solving many diverse problems, including mathematical and physical. etc. of applications.	Matrices and their types	2023/11/9	7
Duty 7	In this chapter, we show how to deal with literal strings and their importance in composing written passages, labels, and many other applications. We also discuss functions and their construction, and the first type of them, which are functions that have a specific value in the general program. We also show how to create a function file by the user and how to store the function in a file, and then use it as a ready-made function.	Strings (Literal Arrays) and Introduction to Functions	2023/11/16	8
Duty 8	In this chapter, we learn how mathematical functions are defined using the passive function method and implicit functions. Also, the types of functions include functions that refer to the values of the general program corresponding to reference values in it, and functions with one name and more than one type (overload functions). In the last part of the chapter, we show subfunctions and overlapping functions.	User-defined functions and function file	2023/11/23	9
Duty 9	In this chapter, we explain how to deal with records and flags about the record and use it to include extensive information about people, companies or institutions, as well as its use in mathematical calculations. We also discuss the definition of a record within another record (nested records) and its applications.	Records (compositions)	2023/11/30	10
Assignment 10	In this chapter, we show how to create a file by the user, how to read and write to the file, and how to store the log and function in a file, and then use it as a ready-made function.	Files and their use with logs and functions	2023/12/7	11
Second Monthly Exam			2023/12/14	12
Duty 11	In this chapter, we explain the importance of indicators and how to deal with them, define them, and use them with matrices (indicator matrix) as well as their use with functions. Also, the use of arithmetic factors with indicators.	Indicators/ Indicators, Matrices / Indices and Functions	2023/12/21	13
Duty 12	In this chapter, we learn how to deal with rows, which are one of the tools that emerge from structured data, where a class can contain both	Rows, builders and destroyers	2023/12/28	14

	data and functions. We also show the role and importance of constructive and destructive ranks in many operations.			
Duty 12	In this chapter, we will discuss friendly functions and friendly classes and learn how to redefine factors to work with new types. We will also learn about the concept of inheritance and how inheritance provides the reusability of categories.	Friendship and Heredity	2023/1/4	15
End of Semester Exam				

Can the < curriculum be developed within the 20% teaching authority > include vocabulary that serves sustainability?	
1- Fighting poverty-2- No hunger-3- Developing lifelong learning and education-4- Green chemistry-5- Sustainable development-6- Water purification-7- Water recycling for agriculture-8- Creativity and production-9- Sustainable energy (wind, solar and organic energy)-10- Environmental development-11- Pollution measurement-12- Child care-13- Public health development-14- Measuring the efficiency of health institutions-15- Gender equality-16- Non-extremism-17- Drug efficiency-18- Food efficiency for infants, children, adults and the elderly-19- Efficiency of the inclusive environment-20- Waste recycling -21- Disposal mechanisms From Heavy Water-22-Literacy-23-Mechanisms for Biodiversity Conservation-24-Mechanisms for Spreading Peace and Justice in the Society-25-Developing Life in the Seas and Oceans-26-Studying the Level of University Education and its Development Mechanisms-27-Mechanisms for Developing Local Industry in Iraq-28-Mechanisms for Developing Infrastructure in Iraq-29-Reducing Racial Discrimination in All Its Forms-30-Basics of Sustainable Cities-31-Mechanisms for Reducing Consumption and Increasing Production-32-Mechanisms for Providing Job Opportunities for All-33-Studying the Aspects of Developing Green Spaces -34-Studying Climatic Phenomena in the Country -35- Mechanisms for good health and well-being.	**1- Yes, maybe within the axes.**
	2- I propose a theme that serves sustainability

Level III Physics of Devices P338

Course Description Form

Course Description

This course description provides a brief summary of the most important characteristics of the course and the learning outcomes expected of the student to achieve and demonstrate whether they have made the most of the available learning opportunities. It should be linked to the program description.

University of Basra – College of Science	64. Educational Institution
Physics	65. Scientific Department/Center
Physics of Devices F338	66. Course Name/Code
Bachelor	67. Programs in which he enters
weekly	68. Available Forms of Attendance
2024-2025	69. Semester/Year
30 Credit Hours	70. Number of Hours (Total)
1-9-2024	71. Date this description was prepared
72. Course Objectives	
Geared towards preparing the bachelor's degree holder to work in government and industrial laboratories, where he possesses the ability to use and modify complex and sophisticated electronic and mechanical equipment. It provides a physical perspective focused on making measurements and interpreting experimental data that is an important counterpoint to the perspective of engineers who focus on construction and mathematicians who focus on analysis. This course focuses on understanding the physical working physics of devices and sensors that are used in industrial, medical, and engineering applications.	

38.Course Outcomes, Teaching, Learning and Assessment Methods

A. Cognitive Objectives

- ✓ **Introduce the student to practical physical devices.**
- ✓ **Introduce the student to how to work on physical devices and make measurements on them.**

b. Skill objectives of the course.

B1 – Acquiring the skill of working on physical devices and making measurements on them.

Teaching and Learning Methods

1. Theoretical lectures and discussions.
2. Use of educational aids (presentations and scientific films)

Evaluation Methods

1. Daily tests and laboratory reports
2. Monthly Tests
3. Final Exams

C. Emotional and Values Goals

A1- The ability to communicate information after presenting, discussing and interpreting it

Teaching and Learning Methods

1. Direct explanation and presentation of lectures.

2- **Powerpoint presentation** and screen.
Evaluation Methods
1. Daily tests and laboratory reports 2. Monthly Tests 3. Final Exams
d. Transferred general and qualifying skills (other skills related to employability and personal development). -D1- Developing the student's mental abilities

39. Course Structure					
Evaluation Method	Teaching Method	Module Name / or Subject	Required Learning Outcomes	Hours	The week
Daily and monthly tests	theoretical	**Theoretical Aspect** **measurements** **instrumentation** **performance characteristics** **Displacement Measurement, Linear and Angular**	The student's understanding of the lesson	2 N	**The first** **The second** **And the third**
Daily and monthly tests	theoretical	**Theoretical Aspect** **Semester Exam** **Capacitive Sensors—Displacement** **Optical Encoder Displacement Sensors**	The student's understanding of the lesson	2 N	**Fourth Fifth** **and the sixth**
Daily and monthly tests	theoretical	**Theoretical Aspect** **Proximity Sensing for Robotics** **Distance Measurements** **Position, Location,** **Altitude Measurement**	The student's understanding of the lesson	2 N	**Seventh and eighth**
Daily and monthly tests	theoretical	**Theoretical Aspect** **Level Measurement** **Temperature and Humidity Measurement**	The student's understanding of the lesson	2 N	**Ninth & Tenth**

		Semester Exam			
Daily and monthly tests	theoret ical	**Theoretical Aspect** **Signal processing** **Ultrasonic Sensors**	The student's understanding of the lesson	2 N	**Eleventh** **and the twelfth**
Daily and monthly tests	theoret ical	**Second Semester Exam**	The student's understanding of the lesson	2 N	**Thirteenth**
Daily and monthly tests	theoret ical	**Theoretical Aspect** **Final Project**	The student's understanding of the lesson	2 N	**Fourteenth** **and fifteenth**

40.Infrastructure

	1 Required Textbooks
1 Introduction to Instrumentation, Sensors, and Process Control, William C. Dunn	2 Main References (Sources)
	Recommended books and references (scientific journals, reports,....)
	in Electronic References, Websites ....

41.Course Development Plan

Communicate in the development of the curriculum based on recent versions of books and references.

And the adoption of modern interactive means of education.

Activating matching programs with international universities to learn about modern curricula and teaching methods and exchange experiences.

Third Level Astronomy F326

Course Description Form

Course Description

This course description provides a brief summary of the most important characteristics of the course and the learning outcomes expected of the student to achieve and demonstrate whether they have made the most of the available learning opportunities. It should be linked to the program description.

University of Basra – College of Science	73. Educational Institution
Physics	74. Scientific Department/Center
Astronomy F326	75. Course Name/Code
Bachelor	76. Programs in which he enters
weekly	77. Available Forms of Attendance
2024-2025	78. Semester/Year
45 Credit Hours	79. Number of Hours (Total)
1-9-2024	80. Date this description was prepared
81. Course Objectives	
The scientific study of the planetarium (Kepler's laws, Newton's laws of motion, the geometry of the sphere, spherical triangles, the planetarium, the coordinate systems on	

the planetarium, the four astronomical seasons, the phenomena of staggering (rotation of the Earth's axis) and extension, astronomical units of measurement.)

Study of the Solar System (Physical Properties of the Sun, Physical Properties of the Moon, Eclipse and Eclipse, Types of Planets and Study of Physical Properties of Planets, Budd Base, Small Asteroids, Meteors and Meteors.)

Knowing the destiny of the stars. Luminosity, Relationship of Luminosity to Luminosity.Motion of Stars, Angular Motion, Radial Velocity, Tangential Velocity, Space Velocity, Factors Affecting Stellar Velocity Measurements.Measurement of the Physical Properties of Stars, Relationship of Mass of Stars to Their Luminosity.Hertz Sprank Diagram

Study of the daily apparent movement of celestial bodiesPhenomena associated with the daily apparent movement of the bodiesSunrise and sunset Length of the twilight periodCalculation of solar time

42.Course Outcomes, Teaching, Learning and Assessment Methods

A. Cognitive Objectives

- ✓ **Introduce the student to the introduction of astronomy, planets, and stars.**

b. Skill objectives of the course.

B1 – Acquiring the skill of knowledge of astronomy.

Teaching and Learning Methods

1. Theoretical lectures and discussions.
2. Use of educational aids (presentations and scientific films)

Evaluation Methods

1. Daily tests and laboratory reports 2. Monthly Tests 3. Final Exams
C. Emotional and Values Goals A1- The ability to communicate information after presenting, discussing and interpreting it
Teaching and Learning Methods
1. Direct explanation and presentation of lectures. 2- **Powerpoint presentation** and screen.
Evaluation Methods
1. Daily tests and laboratory reports 2. Monthly Tests 3. Final Exams
d. Transferred general and qualifying skills (other skills related to employability and personal development). -D1- Developing the student's mental abilities

43. Course Structure					
Evaluation Method	Teaching Method	Module Name / or Subject	Required Learning Outcomes	Hours	The week
Daily and monthly tests	theoretical	**Theoretical Aspect** **General Introduction, Planetarium, Spherical Triangle** **Celestial Mechanics Zodiac System, Galactic System, Movement of Stars in the Sky, Zodiac Zone and Zodiac Circle, Four Astronomical Seasons, Regression and Extension, Astronomical Units of Measurement**	The student's understanding of the lesson	3 N	**The first** **The second** **And the third**
Daily and monthly tests	theoretical	**Theoretical Aspect** **Solar System** **The Sun, the origin of the solar system, the physical properties of the sun, methods of measuring the sun's diameter, mass and surface temperature, the axial motion of the sun, the sun's atmosphere, sunspots (melasma), solar radiation and wind, solar energy and solar constant**	The student's understanding of the lesson	3 N	**Fourth Fifth** **and the sixth**

Daily and monthly tests	theoretical	**Semester Exam** **Theoretical Aspect** **The Moon, the physical properties of the Moon, methods of measuring its diameter, mass, and density, the rate of gravity on the Moon, the speed of the fault on the Moon's surface, the Moon's atmospheric mantle, reflectivity, the magnetic field, the movements of the Moon, the Moon's orbit and rotation, the stellar cycle and the paired cycle, the faces of the Moon during its conjugated cycle**	The student's understanding of the lesson	3 N	**Seventh and eighth**
Daily and monthly tests	theoretical	**Theoretical Aspect** **Calculation of the lunar day, stellar day and solar day, the phenomena of eclipses and eclipses, the number of possible eclipses and eclipses in one year, the importance of studying eclipses**	The student's understanding of the lesson	3 N	**Ninth & Tenth**
Daily and monthly tests	theoretical	**Theoretical Aspect** **Planets Vehicle Physical Properties of Planets Vehicle,**	The student's understanding of the lesson	3 N	**Eleventh** **and the twelfth**

		Base of Pode, Meteors, Comets			
Daily and monthly tests	theoretical	**Second Semester Exam**	The student's understanding of the lesson	3 N	**Thirteenth**
Daily and monthly tests	theoretical	**Theoretical Aspect** **Stars, Star motion, Stellar dimension, Star destiny, Star colors and surface temperatures, Star luminosity, Star diameter measurements, Star mass and density, Star mass and luminosity, Russell, Hertz-Sparnick diagram – Star life, Star life cycle (stellar evolution), Neutron stars, Black holes**	The student's understanding of the lesson	3 N	**Fourteenth** **and fifteenth**

44.Infrastructure

	1 Required Textbooks
[1] Physics of Atmosphere and Space - Part Two - Astronomy - Hamid Majwal Al-Nuaimi and Fayyad Al-Najm [2] Astronomical Algorithms by Jean Meeus (2nd edition, December1998, Willmann-Bell, Inc.).	2 Main References (Sources)

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

45.Course Development Plan
Communicate in the development of the curriculum based on recent versions of books and references. And the adoption of modern interactive means of education. Activating matching programs with international universities to learn about modern curricula and teaching methods and exchange experiences.

Level III Reagents and Detection Methods F321

Course Description Form

Course Description

This course description provides a brief summary of the most important characteristics of the course and the learning outcomes expected of the student to achieve and demonstrate whether they have made the most of the available learning opportunities. It should be linked to the program description.

University of Basra – College of Science	82. Educational Institution
Physics	83. Scientific Department/Center
Reagents and detection methods P321	84. Course Name/Code
Bachelor, Master, PhD	85. Programs in which he enters
weekly	86. Available Forms of Attendance
2024-2025	87. Semester/Year
30 Credit Hours	88. Number of Hours (Total)
1-9-2024	89. Date this description was prepared
90. Course Objectives	
It aims to study different types of nuclear radiation detectors and study their mechanism of action... and methods of detection in addition to the most important types of radiation and its interaction with matter.	

46.Course Outcomes, Teaching, Learning and Assessment Methods

A. Cognitive Objectives

- ✓ **Introduce the student to an introduction to nuclear radiation detectors.**
- ✓ **Introduce the student to the processes that take place within these reagents.**
- ✓ **Study the impact of nuclear reagents on ecosystem change.**
- ✓ **Introduce the student to the most important safety conditions and the initial procedures followed.**

b. Skill objectives of the course.

B1 - Inferring ways to protect the ecosystem by knowing how to prevent radiation.

Teaching and Learning Methods

1. Theoretical lectures and discussions.

2. Use of educational aids (presentations and scientific films)

Evaluation Methods

1. Daily tests and laboratory reports

2. Monthly Tests

3. Final Exams

C. Emotional and Values Goals

A1- The ability to communicate information after presenting, discussing and interpreting it

Teaching and Learning Methods

1. Direct explanation and presentation of lectures.

2- **Powerpoint presentation** and screen.

Evaluation Methods
1. Daily tests and laboratory reports 2. Monthly Tests 3. Final Exams
d. Transferred general and qualifying skills (other skills related to employability and personal development). -D1- Developing the student's mental abilities D2 Understand the processes that take place inside nuclear reagents and their impact on the environment.

47. Course Structure					
Evaluation Method	Teaching Method	Module Name / or Subject	Required Learning Outcomes	Hours	The week
Daily and monthly tests	theoretical	**Theoretical Aspect** **General Introduction to Nuclear Reagents, Radioactivity with Matter, Lost Energy**	The student's understanding of the lesson	2 N	**The first** **The second** **And the third**
Daily and monthly tests	theoretical	**Theoretical Aspect** **extent** **Interaction of neutrons with matter**	The student's understanding of the lesson	2 N	**Fourth Fifth** **and the sixth**
Daily and monthly tests	theoretical	**First Semester Exam**	The student's understanding of the lesson	2 N	**Seventh and eighth**
Daily and monthly tests	theoretical	**Theoretical Aspect** **Types of Reagents...** **flash detectors** **Semiconductor Reagents**	The student's understanding of the lesson	2 N	**Ninth & Tenth**
Daily and monthly tests	theoretical	**Second Semester Exam**	The student's understanding of the lesson	2 N	**Eleventh** **and the twelfth**
Daily and monthly tests	theoretical	**Theoretical Aspect** **Neutron detectors**	The student's understanding of the lesson	2 N	**Thirteenth**

Daily and monthly tests	theoret ical	**Third Semester Exam**	The student's understanding of the lesson	2 N	**Fourtee nth and fifteenth**

48.Infrastructure

	1 Required Textbooks
[1]Principles of Nuclear Physics (Meyerhoff) [2]Introduction to Nuclear Physics (ENCA) [3]Nuclear Radiation Detection(Shatha Salman)	2 Main References (Sources)
	Recommended books and references (scientific journals, reports,....)
	in Electronic References, Websites ....

49.Course Development Plan

Communicate in the development of the curriculum based on recent versions of books and references.

And the adoption of modern interactive means of education.

Activating twinning programs with international universities to learn about modern curricula and teaching methods and exchange experiences.

evel III X-ray F318

Course Description Form

Course Description

This course description provides a brief summary of the most important characteristics of the course and the learning outcomes expected of the student to achieve and demonstrate whether they have made the most of the available learning opportunities. It should be linked to the program description.

University of Basra – College of Science	91. Educational Institution
Physics	92. Scientific Department/Center
X-rays	93. Course Name/Code
Bachelor	94. Programs in which he enters
weekly	95. Available Forms of Attendance
2024-2025	96. Semester/Year
30 Credit Hours	97. Number of Hours (Total)
1-9-2024	98. Date this description was prepared
99. Course Objectives	
The X-ray course P318 examines the basic concepts of X-rays and their applications in scientific research, medicine, and industries. The course provides information on how X-rays are generated and produced, as well as the study of X-ray absorption, X-ray filters, optics, and detectors, and the hazards caused by X-rays. It also teaches the basic principles of diffraction and elongation and the factors affecting the intensity of X-rays. It also includes	

the study of different techniques, the basic principle of which is X-rays, and the use of X-ray techniques in the fields of X-rays. Scientific, medical, and industrial. X-ray diffraction is one of the techniques used in scientific research fields and determines the synthetic analysis of materials, material type, and others. We will study both X-ray radiation and CT scans, which are medical X-ray techniques. In addition to other techniques such as small-angle X-ray scattering, X-ray fluorescence, proton-induced X-ray emission, and photoelectron X-ray spectroscopy.

50.Course Outcomes, Teaching, Learning and Assessment Methods

A. Cognitive Objectives

- ✓ **The X-ray course P318 aims to help students understand the basic concepts of X-rays and their applications in scientific research, medicine, and industry. The course provides information on how X-rays are generated and produced, as well as the study of X-ray absorption, filters, optics, X-ray reagents and the risks of X-rays. It also studies the basic principles of diffraction and elongation and the factors affecting the intensity of X-rays. It also includes the study of different technologies, the basic principle of which is X-ray, and X-ray techniques are used in various scientific, medical, and industrial fields. X-ray diffraction is one of the techniques used in scientific research fields and determines the synthetic analysis of materials, material type, and others. We will study both X-ray radiation and CT scans, which are medical X-ray techniques. In addition to other techniques such as small-angle X-ray scattering, X-ray fluorescence, proton-induced X-ray emission, and photoelectron X-ray spectroscopy.**

b. Skill objectives of the course.

B1 – Acquire the skill of X-ray diagnosis.

Teaching and Learning Methods

1. Theoretical lectures and discussions.
2. Use of educational aids (presentations and scientific films)

Evaluation Methods

1. Daily tests and laboratory reports
2. Monthly Tests

3. Final Exams
C. Emotional and Values Goals A1- The ability to communicate information after presenting, discussing and interpreting it C2- Linking information to the environmental reality and the land system and the extent of its impact on different neighborhoods
Teaching and Learning Methods
1. Direct explanation and presentation of lectures. 2- **Powerpoint presentation** and screen.
Evaluation Methods
1. Daily tests and laboratory reports 2. Monthly Tests 3. Final Exams
d. Transferred general and qualifying skills (other skills related to employability and personal development). -D1- Developing the student's mental abilities

51. Course Structure					
Evaluation Method	Teaching Method	Module Name / or Subject	Required Learning Outcomes	Hours	The week
Daily and monthly tests	theoretical	**Theoretical Aspect** **A review and introduction to the science of X-ray crystals, the nature of X-rays, and the production and spectrum of X-rays.** **Absorbers, filters, optics, X-ray detectors and safety** **Introduction to Dispersion and Diffraction**	The student's understanding of the lesson	2 N	**The first** **The second** **And the third**
Daily and monthly tests	theoretical	**Theoretical Aspect** **Crystal Composition Analysis and X-Ray Diffraction Identification and Quantum Phase Analysis** **Crystallization size, retinal strain, ideal crystals, stress and structure**	The student's understanding of the lesson	2 N	**Fourth Fifth** **and the sixth**
Daily and monthly tests	theoretical	**Semester Exam** **Theoretical Aspect** **X-ray Radiation and its Quantitative Advantages** **X-ray imaging techniques and**	The student's understanding of the lesson	2 N	**Seventh and eighth**

		medical applications of X-ray irradiation			
Daily and monthly tests	theoretical	**Theoretical Aspect** **Tomography** **Applications of CT scans**	The student's understanding of the lesson	2 N	**Ninth & Tenth**
Daily and monthly tests	theoretical	**Theoretical Aspect** **Small angle X-ray scattering** **X-ray fluorescence**	The student's understanding of the lesson	2 N	**Eleventh** **and the twelfth**
Daily and monthly tests	theoretical	**Second Semester Exam**	The student's understanding of the lesson	2 N	**Thirteenth**
Daily and monthly tests	theoretical	**Theoretical Aspect** **Proton-induced X-ray emission** **Electrophotovoltaic X-ray Spectroscopy**	The student's understanding of the lesson	2 N	**Fourteenth** **and fifteenth**

52.Infrastructure

	1 Required Textbooks
1- Elements of X-Ray Diffraction, B.D. Cullity S.R. Stock, Third Edition, 2014. 2-X-Ray Diffraction Crystallography, Yoshio Waseda, Eiichiro Matsubara, Kozo Shinoda, 2011. 3-Introduction to Medical Imaging Physics, Engineering and Clinical Applications, Nadine Barrie Smith, 2011	2 Main References (Sources)
	Recommended books and references (scientific journals, reports,....)

	in Electronic References, Websites ....

53.Course Development Plan
Communicate in the development of the curriculum based on recent versions of books and references. And the adoption of modern interactive means of education. Activating matching programs with international universities to learn about modern curricula and teaching methods and exchange experiences.

Level III Logical Circuits F310

Course Description Form

Course Description

This course description provides a brief summary of the most important characteristics of the course and the learning outcomes expected of the student to achieve and demonstrate whether they have made the most of the available learning opportunities. It should be linked to the program description.

University of Basra – College of Science	100. Educational Institution
Physics	101. Scientific Department/Center
P310 Logic Circuits	102. Course Name/Code
Bachelor	103. Programs in which he enters
weekly	104. Available Forms of Attendance
2024-2025	105. Semester/Year
30 Credit Hours	106. Number of Hours (Total)
1-9-2024	107. Date this description was prepared
108. Course Objectives	
Introducing the student to numerical systems and logical gates and their properties, how to design logic using Karnoff diagrams, defining addition and subtraction circuits, comparison circuits, multi-output circuits such as encoder, cipher, and multiplexer, and	

how to design logical circuits using these circuits, and introducing the student to flip circuits and their types and how to benefit from them in building meter circuits.

54.Course Outcomes, Teaching, Learning and Assessment Methods

A. Cognitive Objectives

- ✓ **Introduce the student to numerical systems and logical gates and their properties, how to design logic using Karnov diagrams, define addition and subtraction circuits, comparison circuits, multi-output circuits such as encoder, cipher, multiplexer, and how to design logical circuits using these circuits.**
- ✓ **. Introducing the student to the circuits of tippers, their types, and how to benefit from them in building meter circuits**

b. Skill objectives of the course.

B1 – Acquire the skill of calculating logic circles.

Teaching and Learning Methods

1. Theoretical lectures and discussions.

2. Use of educational aids (presentations and scientific films)

Evaluation Methods

1. Daily tests and laboratory reports

2. Monthly Tests

3. Final Exams

C. Emotional and Values Goals

A1- The ability to communicate information after presenting, discussing and interpreting it
Teaching and Learning Methods
1. Direct explanation and presentation of lectures. 2- **Powerpoint presentation** and screen.
Evaluation Methods
1. Daily tests and laboratory reports 2. Monthly Tests 3. Final Exams
d. Transferred general and qualifying skills (other skills related to employability and personal development). -D1- Developing the student's mental abilities

55. Course Structure					
Evaluation Method	Teaching Method	Module Name / or Subject	Required Learning Outcomes	Hours	The week
Daily and monthly tests	theoretical	**Theoretical Aspect** **Numerical Systems**	The student's understanding of the lesson	2 N	**The first** **The second** **And the third**
Daily and monthly tests	theoretical	**Theoretical Aspect** **Coding Systems** **Logic Gates** **Logic Simplification**	The student's understanding of the lesson	2 N	**Fourth Fifth** **and the sixth**
Daily and monthly tests	theoretical	**Semester Exam** **Theoretical Aspect** **Karnough's Maps** **Karnough's Maps**	The student's understanding of the lesson	2 N	**Seventh and eighth**
Daily and monthly tests	theoretical	**Theoretical Aspect** **Arithmetic & Comparing Circuits**	The student's understanding of the lesson	2 N	**Ninth & Tenth**
Daily and monthly tests	theoretical	**Theoretical Aspect** **Encoders, Decoders** **Multiplixers**	The student's understanding of the lesson	2 N	**Eleventh** **and the twelfth**
Daily and monthly tests	theoretical	**Second Semester Exam**	The student's understanding of the lesson	2 N	**Thirteenth**

Daily and monthly tests	theoret ical	**Theoretical Aspect** **Flip-Flops** **Counters**	The student's understanding of the lesson	2 N	**Fourtee nth** **and fifteenth**

56.Infrastructure	
	1 Required Textbooks
[1] Introduction to Logic Design, Alan B. Marcovitz, Third Ed. [2] Digital Design- Morris Mano, PHI, 3rd Edition [3] Principles of Logic Design, Qasim M. Hussein, 2013.	2 Main References (Sources)
	Recommended books and references (scientific journals, reports,....)
	in Electronic References, Websites ....

57.Course Development Plan
Communicate in the development of the curriculum based on recent versions of books and references. And the adoption of modern interactive means of education. Activating matching programs with international universities to learn about modern curricula and teaching methods and exchange experiences.

Level III Logical Circuits F310

Course Description Form

Course Dscription

This course description provides a brief summary of the most important characteristics of the course and the learning outcomes expected of the student to achieve and demonstrate whether they have made the most of the available learning opportunities. It should be linked to the program description.

University of Basra – College of Science	109. Educational Institution
Physics	110. Scientific Department/Center
P310 Logic Circuits	111. Course Name/Code
Bachelor	112. Programs in which he enters
weekly	113. Available Forms of Attendance
2024-2025	114. Semester/Year
30 Credit Hours	115. Number of Hours (Total)
1-9-2024	116. Date this description was prepared
117. Course Objectives	
Introducing the student to numerical systems and logical gates and their properties, how to design logic using Karnoff diagrams, defining addition and subtraction circuits, comparison circuits, multi-output circuits such as encoder, cipher, and multiplexer, and	

how to design logical circuits using these circuits, and introducing the student to flip circuits and their types and how to benefit from them in building meter circuits.

58.Course Outcomes, Teaching, Learning and Assessment Methods

A. Cognitive Objectives

- ✓ **Introduce the student to numerical systems and logical gates and their properties, how to design logic using Karnov diagrams, define addition and subtraction circuits, comparison circuits, multi-output circuits such as encoder, cipher, multiplexer, and how to design logical circuits using these circuits.**
- ✓ **. Introducing the student to the circuits of tippers, their types, and how to benefit from them in building meter circuits**

b. Skill objectives of the course.

B1 – Acquire the skill of calculating logic circles.

Teaching and Learning Methods

1. Theoretical lectures and discussions.

2. Use of educational aids (presentations and scientific films)

Evaluation Methods

1. Daily tests and laboratory reports

2. Monthly Tests

3. Final Exams

C. Emotional and Values Goals

A1- The ability to communicate information after presenting, discussing and interpreting it
Teaching and Learning Methods
1. Direct explanation and presentation of lectures. 2- **Powerpoint presentation** and screen.
Evaluation Methods
1. Daily tests and laboratory reports 2. Monthly Tests 3. Final Exams
d. Transferred general and qualifying skills (other skills related to employability and personal development). -D1- Developing the student's mental abilities

59. Course Structure					
Evaluation Method	Teaching Method	Module Name / or Subject	Required Learning Outcomes	Hours	The week
Daily and monthly tests	theoretical	**Theoretical Aspect** **Numerical Systems**	The student's understanding of the lesson	2 N	**The first** **The second** **And the third**
Daily and monthly tests	theoretical	**Theoretical Aspect** **Coding Systems** **Logic Gates** **Logic Simplification**	The student's understanding of the lesson	2 N	**Fourth Fifth** **and the sixth**
Daily and monthly tests	theoretical	**Semester Exam** **Theoretical Aspect** **Karnough's Maps** **Karnough's Maps**	The student's understanding of the lesson	2 N	**Seventh and eighth**
Daily and monthly tests	theoretical	**Theoretical Aspect** **Arithmetic & Comparing Circuits**	The student's understanding of the lesson	2 N	**Ninth & Tenth**
Daily and monthly tests	theoretical	**Theoretical Aspect** **Encoders, Decoders** **Multiplixers**	The student's understanding of the lesson	2 N	**Eleventh** **and the twelfth**
Daily and monthly tests	theoretical	**Second Semester Exam**	The student's understanding of the lesson	2 N	**Thirteenth**

Daily and monthly tests	theoret ical	**Theoretical Aspect** **Flip-Flops** **Counters**	The student's understanding of the lesson	2 N	**Fourtee nth** **and fifteenth**

60.Infrastructure	
	1 Required Textbooks
[1] Introduction to Logic Design, Alan B. Marcovitz, Third Ed. [2] Digital Design- Morris Mano, PHI, 3rd Edition [3] Principles of Logic Design, Qasim M. Hussein, 2013.	2 Main References (Sources)
	Recommended books and references (scientific journals, reports,....)
	in Electronic References, Websites ....

61.Course Development Plan
Communicate in the development of the curriculum based on recent versions of books and references. And the adoption of modern interactive means of education. Activating matching programs with international universities to learn about modern curricula and teaching methods and exchange experiences.

Level III Solar Power V309

Course Description Form

Course Description

This course description provides a brief summary of the most important characteristics of the course and the learning outcomes expected of the student to achieve and demonstrate whether they have made the most of the available learning opportunities. It should be linked to the program description.

University of Basra – College of Science	118. Educational Institution
Physics	119. Scientific Department/Center
Solar Power P309	120. Course Name/Code
Bachelor	121. Programs in which he enters
weekly	122. Available Forms of Attendance
2024-2025	123. Semester/Year
30 Credit Hours	124. Number of Hours (Total)
1-9-2024	125. Date this description was prepared
126. Course Objectives	
Solar energy is considered the main source of energy on the planet, and from it it has been distributed and transformed into other energy sources, whether it is a reserve of wind energy, thermal energy in the earth's atmosphere, energy generated from	

watersheds, solar energy, and other energy sources such as coal and wood, and since solar energy is the most important source of renewable energy during the next century, the efforts of many countries are directed to it in various forms and allocate the necessary amounts for the development of products and research for the exploitation of energy Solar as one of the most important alternative energy sources for oil and gas, and it has given the largest share in research and applications to the field of converting this source of solar energy into electricity, which is known as photovoltaics

. The availability of electrical energy has become one of the most important factors for finding the infrastructure in it, and it does not require the production of electricity from solar energy to centralize generation, but it produces energy and is used in the same area or place, and this will save a lot of transportation and transportation costs, and this method depends mainly on converting sunlight into electrical energy, and there are many materials in nature that are used in the manufacture of solar cells, which are combined with a specific electrical and engineering system to form the so-called solar panel, which Exposes to sunlight at a certain angle to produce the most electricity

62.Course Outcomes, Teaching, Learning and Assessment Methods

A. Cognitive Objectives

Explain the technical and physical principles of solar energy and the devices that are used to make use of this energy such as solar cells and solar collectors. Also, different solar energy technologies are measured and evaluated by knowing the physical function of these devices, calculating the required size of solar cell systems and solar energy collectors from a specific energy need using appropriate software, and communicating technological, environmental, social, and economic issues around solar energy in a concise and accessible manner.

b. Skill objectives of the course.

B1 – Acquire the skill of electromagnetic radiation diagnosis (radiation spectrum, solar constant).

B2 - Inference to know the factors affecting solar radiation, solar angles.

Teaching and Learning Methods

1. Theoretical lectures and discussions.

2. Use of educational aids (presentations and scientific films)
Evaluation Methods
1. Daily tests and laboratory reports 2. Monthly Tests 3. Final Exams
C. Emotional and Values Goals A1- The ability to communicate information after presenting, discussing and interpreting it
Teaching and Learning Methods
1. Direct explanation and presentation of lectures. 2- **Powerpoint presentation** and screen.
Evaluation Methods
1. Daily tests and laboratory reports 2. Monthly Tests 3. Final Exams
d. Transferred general and qualifying skills (other skills related to employability and personal development). -D1- Developing the student's mental abilities

63. Course Structure					
Evaluation Method	Teaching Method	Module Name / or Subject	Required Learning Outcomes	Hours	The week
Daily and monthly tests	theoretical	**Theoretical Aspect** **Components and composition of the sun** **Geometrical Relationships between the Sun and the Earth** **Electromagnetic radiation (radiation spectrum, solar constant)**	The student's understanding of the lesson	2 N	**The first** **The second** **And the third**
Daily and monthly tests	theoretical	**Theoretical Aspect** **Factors affecting solar radiation** **Solar Corners** **Semester exam** **Solar Cells** **Solar Cell Manufacturing**	The student's understanding of the lesson	2 N	**Fourth Fifth** **and the sixth**
Daily and monthly tests	theoretical	**Semester Exam** **Theoretical Aspect** **Solar Cell Features** **The Effect of Parasitic Resistance**	The student's understanding of the lesson	2 N	**Seventh and eighth**

Daily and monthly tests	theoretical	**Semester exam** **Theoretical Aspect** **Quantitative efficiency and spectral response**	The student's understanding of the lesson	2 N	**Ninth & Tenth**
Daily and monthly tests	theoretical	**Theoretical Aspect** **Solar Collectors** **Flat Complexes**	The student's understanding of the lesson	2 N	**Eleventh** **and the twelfth**
Daily and monthly tests	theoretical	**Concentrated Solar Collectors**	The student's understanding of the lesson	2 N	**Thirteenth**
Daily and monthly tests	theoretical	**Theoretical Aspect** **Solar Panels** **Solar Energy Systems**	The student's understanding of the lesson	2 N	**Fourteenth** **and fifteenth**

64.Infrastructure

	1 Required Textbooks
Solar Cells **Technical Working Principles and System Applications** **Written by Martin A. Crane**	2 Main References (Sources)
	Recommended books and references (scientific journals, reports,....)
	in Electronic References, Websites ....

65.Course Development Plan

Communicate in the development of the curriculum based on recent versions of books and references.

And the adoption of modern interactive means of education.

Activating matching programs with international universities to learn about modern curricula and teaching methods and exchange experiences.

Level III Physics of Devices P338

Course Description Form

Course Description

This course description provides a brief summary of the most important characteristics of the course and the learning outcomes expected of the student to achieve and demonstrate whether they have made the most of the available learning opportunities. It should be linked to the program description.

University of Basra – College of Science	127. Educational Institution
Physics	128. Scientific Department/Center
Physics of Devices F338	129. Course Name/Code
Bachelor	130. Programs in which he enters
weekly	131. Available Forms of Attendance
2024-2025	132. Semester/Year
30 Credit Hours	133. Number of Hours (Total)
1-9-2024	134. Date this description was prepared
135. Course Objectives	
Geared towards preparing the bachelor's degree holder to work in government and industrial laboratories, where he possesses the ability to use and modify complex and sophisticated electronic and mechanical equipment. It provides a physical perspective focused on making measurements and interpreting experimental data that is an important counterpoint to the perspective of engineers who focus on construction and	

mathematicians who focus on analysis. This course focuses on understanding the physical working physics of devices and sensors that are used in industrial, medical, and engineering applications.

66.Course Outcomes, Teaching, Learning and Assessment Methods

A. Cognitive Objectives

- ✓ **Introduce the student to practical physical devices.**
- ✓ **Introduce the student to how to work on physical devices and make measurements on them.**

b. Skill objectives of the course.

B1 – Acquiring the skill of working on physical devices and making measurements on them.

Teaching and Learning Methods

1. Theoretical lectures and discussions.

2. Use of educational aids (presentations and scientific films)

Evaluation Methods

1. Daily tests and laboratory reports

2. Monthly Tests

3. Final Exams

C. Emotional and Values Goals

A1- The ability to communicate information after presenting, discussing and interpreting it

Teaching and Learning Methods

1. Direct explanation and presentation of lectures.

2- **Powerpoint presentation** and screen.

Evaluation Methods

1. Daily tests and laboratory reports

2. Monthly Tests

3. Final Exams

d. Transferred general and qualifying skills (other skills related to employability and personal development).

-D1- Developing the student's mental abilities

67. Course Structure					
Evaluation Method	Teaching Method	Module Name / or Subject	Required Learning Outcomes	Hours	The week
Daily and monthly tests	theoretical	**Theoretical Aspect** **measurements** **instrumentation** **performance characteristics** **Displacement Measurement, Linear and Angular**	The student's understanding of the lesson	2 N	**The first** **The second** **And the third**
Daily and monthly tests	theoretical	**Theoretical Aspect** **Semester Exam** **Capacitive Sensors—Displacement** **Optical Encoder Displacement Sensors**	The student's understanding of the lesson	2 N	**Fourth Fifth** **and the sixth**
Daily and monthly tests	theoretical	**Theoretical Aspect** **Proximity Sensing for Robotics** **Distance Measurements** **Position, Location,** **Altitude Measurement**	The student's understanding of the lesson	2 N	**Seventh and eighth**
Daily and monthly tests	theoretical	**Theoretical Aspect** **Level Measurement** **Temperature and Humidity Measurement**	The student's understanding of the lesson	2 N	**Ninth & Tenth**

		Semester Exam			
Daily and monthly tests	theoret ical	**Theoretical Aspect** **Signal processing** **Ultrasonic Sensors**	The student's understanding of the lesson	2 N	**Eleventh** **and the twelfth**
Daily and monthly tests	theoret ical	**Second Semester Exam**	The student's understanding of the lesson	2 N	**Thirteenth**
Daily and monthly tests	theoret ical	**Theoretical Aspect** **Final Project**	The student's understanding of the lesson	2 N	**Fourteenth** **and fifteenth**

68.Infrastructure

	1 Required Textbooks
1 Introduction to Instrumentation, Sensors, and Process Control, William C. Dunn	2 Main References (Sources)
	Recommended books and references (scientific journals, reports,....)
	in Electronic References, Websites ....

69.Course Development Plan

Communicate in the development of the curriculum based on recent versions of books and references.

And the adoption of modern interactive means of education.

Activating matching programs with international universities to learn about modern curricula and teaching methods and exchange experiences.

Level III Atomic Physics P307

Course Description Form

Course Description

This course description provides a brief summary of the most important characteristics of the course and the learning outcomes expected of the student to achieve and demonstrate whether they have made the most of the available learning opportunities. It should be linked to the program description.

University of Basra – College of Science	136. Educational Institution
Physics	137. Scientific Department/Center
Atomic Physics P307	138. Course Name/Code
Bachelor	139. Programs in which he enters
weekly	140. Available Forms of Attendance
2024-2025	141. Semester/Year
60 Credit Hours	142. Number of Hours (Total)
1-9-2024	143. Date this description was prepared
144. Course Objectives	
The student's ability to recognize atomic interactions between particles.	

70.Course Outcomes, Teaching, Learning and Assessment Methods
A. Cognitive Objectives ✓ **Introduce the student to an introduction to quantum numbers in atomic construction** ✓ **Hound Rule Study** ✓ **The Zeeman Effect**
b. Skill objectives of the course. B1 – Acquiring the skill of detecting atomic spectra.
Teaching and Learning Methods
1. Theoretical lectures and discussions. 2. Use of educational aids (presentations and scientific films)
Evaluation Methods
1. Daily tests and laboratory reports 2. Monthly Tests 3. Final Exams
C. Emotional and Values Goals A1- The ability to communicate information after presenting, discussing and interpreting it
Teaching and Learning Methods

1. Direct explanation and presentation of lectures. 2- **Powerpoint presentation** and screen.
Evaluation Methods
1. Daily tests and laboratory reports 2. Monthly Tests 3. Final Exams
d. Transferred general and qualifying skills (other skills related to employability and personal development). -D1- Developing the student's mental abilities

71. Course Structure					
Evaluation Method	Teaching Method	Module Name / or Subject	Required Learning Outcomes	Hours	The week
Daily and monthly tests	theoretical	**Theoretical Aspect** **Atomic Spectra** **Bohr's theorem** **Quantizing the hydrogen atom**	The student's understanding of the lesson	3 N+1 p	**The first** **The second** **And the third**
Daily and monthly tests	theoretical	**Theoretical Aspect** **The principle of reversal** **Semester exam** **Quantum Preparation in Atomic Construction**	The student's understanding of the lesson	3 N+1 p	**Fourth Fifth** **and the sixth**
Daily and monthly tests	theoretical	**Theoretical Aspect** **Pauli's Exception Principle** **Hound Base**	The student's understanding of the lesson	3 N+1 p	**Seventh and eighth**
Daily and monthly tests	theoretical	**Semester exam** **Theoretical Aspect** **Permetry and orbital dipole moment of the electron**	The student's understanding of the lesson	3 N+1 p	**Ninth & Tenth**
Daily and monthly tests	theoretical	**Theoretical Aspect** **Managed Twisting Reaction** **Selection Rules**	The student's understanding of the lesson	3 N+1 p	**Eleventh** **and the twelfth**

Daily and monthly tests	theoret ical	**Second Semester Exam**	The student's understanding of the lesson	3 N+1 p	**Thirteen th**
Daily and monthly tests	theoret ical	**Theoretical Aspect** **The Zeeman Effect** **Stark Effect**	The student's understanding of the lesson	3 N+1 p	**Fourtee nth** **and fifteenth**

72.Infrastructure

	1 Required Textbooks
1- Atomic Physics - Taleb Nahi Al-Khafaji 2- Modern Physics - Monim Shukour	2 Main References (Sources)
	Recommended books and references (scientific journals, reports,....)
	in Electronic References, Websites ....

73.Course Development Plan

Communicate in the development of the curriculum based on recent versions of books and references.

And the adoption of modern interactive means of education.

Activating matching programs with international universities to learn about modern curricula and teaching methods and exchange experiences.

Level III Quantum Mechanics F301

Course Description Form

Course Description

This course description provides a brief summary of the most important characteristics of the course and the learning outcomes expected of the student to achieve and demonstrate whether they have made the most of the available learning opportunities. It should be linked to the program description.

University of Basra – College of Science	145. Educational Institution
science	146. Scientific Department/Center
Quantum Mechanics F301	147. Course Name/Code
Bachelor, Master	148. Programs in which he enters
weekly	149. Available Forms of Attendance
2024-2025	150. Semester/Year
45 Credit Hours	151. Number of Hours (Total)
1-9-2024	152. Date this description was prepared
153. Course Objectives	
Course P 301 aims to explain the set of physical theories that emerged in the twentieth century to explain phenomena at or below the atomic level, and these theories combined the particle property and the wave property to appear the term wave-particle duality, and thus	

the responsibility of quantum mechanics becomes the physical explanation at the atomic level.

74.Course Outcomes, Teaching, Learning and Assessment Methods
A. Cognitive Objectives ✓ **Introduce the student to an introduction to the basics of quantum mechanics** ✓ **Introducing the student to the Schrödenker Dependent and Non-Time-Based Equation** ✓ **Study of the Wave Function**
b. Skill objectives of the course. B1 – Calculations of expected values. B2 - Formulation of a Matrix of Quantum Mechanics
Teaching and Learning Methods
1. Theoretical lectures and discussions. 2. Use of educational aids (presentations and scientific films)
Evaluation Methods
1. Daily tests and laboratory reports 2. Monthly Tests 3. Final Exams

C. Emotional and Values Goals

A1- The ability to communicate information after presenting, discussing and interpreting it

Teaching and Learning Methods

1. Direct explanation and presentation of lectures.

2- **Powerpoint presentation** and screen.

Evaluation Methods

1. Daily tests and laboratory reports

2. Monthly Tests

3. Final Exams

d. Transferred general and qualifying skills (other skills related to employability and personal development).

-D1- Developing the student's mental abilities

D2 Understanding Underground and Surface Geological Processes and Ground Movements

Identifying geological hazards and their impact on the biosphere

Identify the procedures used to reduce and reduce geological hazards and their impacts

75. Course Structure					
Evaluation Method	Teaching Method	Module Name / or Subject	Required Learning Outcomes	Hours	The week
Daily and monthly tests	theoretical	**Theoretical Aspect** **Concepts of Quantum Mechanics** **Wave Mechanics** **Probability**	The student's understanding of the lesson	3 N	**The first** **The second** **And the third**
Daily and monthly tests	theoretical	**Theoretical Aspect** **Calibration and current density** **Schrödinger's equation with applications**	The student's understanding of the lesson	3 N	**Fourth Fifth** **and the sixth**
Daily and monthly tests	theoretical	**Semester Exam** **Theoretical Aspect** **Massive at a voltage barrier** **Particles Bound in a Well Voltage** **Simple harmonic oscillator (algebraic processing)**	The student's understanding of the lesson	3 N	**Seventh and eighth**
Daily and monthly tests	theoretical	**Theoretical Aspect** **Simple Harmonic Oscillator (Analytical Processing)** **Predicted Values Calculations**	The student's understanding of the lesson	3 N	**Ninth & Tenth**

Daily and monthly tests	theoretical	**Theoretical Aspect** **Matrix formulation of quantum mechanics** **Momentum and Location Matrix**	The student's understanding of the lesson	3 N	**Eleventh** **and the twelfth**
Daily and monthly tests	theoretical	**Second Semester Exam**	The student's understanding of the lesson	3 N	**Thirteenth**
Daily and monthly tests	theoretical	**Theoretical Aspect** **Hamiltonin Matrix for Simple Oscillator** **Pure matrix processing of simple harmonic oscillator**	The student's understanding of the lesson	3 N	**Fourteenth** **and fifteenth**

76.Infrastructure

	1 Required Textbooks
[1] Introduction to Quantum Mechanics by David Croft [2] Introduction to Quantum Mechanics by Dr. Hashem Abboud and Dr. Diaa Al-Mukhtar in Arabic [3] Fundamentals of Quantum Mechanics by Robert White	2 Main References (Sources)
	Recommended books and references (scientific journals, reports,....)
	in Electronic References, Websites ....

77.Course Development Plan

Communicate in the development of the curriculum based on recent versions of books and references.

And the adoption of modern interactive means of education.

Activating matching programs with international universities to learn about modern curricula and teaching methods and exchange experiences.

Level IV Molecular Physics P437

Course Description Form

Course Description

This course description provides a brief summary of the most important characteristics of the course and the learning outcomes expected of the student to achieve and demonstrate whether they have made the most of the available learning opportunities. It should be linked to the program description.

University of Basra – College of Science	154. Educational Institution
Physics	155. Scientific Department/Center
Molecular Physics P437	156. Course Name/Code
Bachelor, Master	157. Programs in which he enters
weekly	158. Available Forms of Attendance
2024-2025	159. Semester/Year
30 Credit Hours	160. Number of Hours (Total)
1-9-2024	161. Date this description was prepared
162. Course Objectives	
Calculation of the rotational, vibrating, and molecular electronics transition spectrum	

78.Course Outcomes, Teaching, Learning and Assessment Methods

A. Cognitive Objectives

- ✓ **Introduce the student to an introduction to molecular physics.**
- ✓ **Introduce the student to how the molecular rotational spectrum arises as a result of the movement of atoms bonded together within the molecule around a specific axis.**
- ✓ **Study of molecules classified as symmetrical solid rotor that have a different inertial moment from the linear and spherical state**
- ✓ **Recognize the nature of molecular vibration. Molecular vibration, which represents the change in the length of the bonds between adjacent atoms in a single molecule, as if this process occurs within a confined range between the two adjacent atoms.**

b. Skill objectives of the course.

B1 – Acquire the skill of recognizing the details of molecular physics.

Teaching and Learning Methods

1. Theoretical lectures and discussions.

2. Use of educational aids (presentations and scientific films)

Evaluation Methods

1. Daily tests and laboratory reports

2. Monthly Tests

3. Final Exams

C. Emotional and Values Goals

A1- The ability to communicate information after presenting, discussing and interpreting it

Teaching and Learning Methods
1. Direct explanation and presentation of lectures. 2- **Powerpoint presentation** and screen.
Evaluation Methods
1. Daily tests and laboratory reports 2. Monthly Tests 3. Final Exams
d. Transferred general and qualifying skills (other skills related to employability and personal development). -D1- Developing the student's mental abilities

79. Course Structure					
Evaluation Method	Teaching Method	Module Name / or Subject	Required Learning Outcomes	Hours	The week
Daily and monthly tests	theoretical	**Theoretical Aspect** **Rotary Spectrum** **Rotational motion of molecules** **Rotational energy levels**	The student's understanding of the lesson	2 N	**The first** **The second** **And the third**
Daily and monthly tests	theoretical	**Theoretical Aspect** **Particles like a spherical solid rotor** **Particles as symmetrical solid rotor** **Centrifugal Deformation**	The student's understanding of the lesson	2 N	**Fourth Fifth** **and the sixth**
Daily and monthly tests	theoretical	**Semester Exam** **Theoretical Aspect** **Molecular Vibration Spectrum**	The student's understanding of the lesson	2 N	**Seventh and eighth**
Daily and monthly tests	theoretical	**Theoretical Aspect** **Convergence of energy levels** **Vibration-Rotation**	The student's understanding of the lesson	2 N	**Ninth & Tenth**
Daily and monthly tests	theoretical	**Theoretical Aspect** **Electronic Transfers**	The student's understanding of the lesson	2 N	**Eleventh** **and the twelfth**

Daily and monthly tests	theoret ical	**Second Semester Exam**	The student's understanding of the lesson	2 N	**Thirteen th**
Daily and monthly tests	theoret ical	**Theoretical Aspect** **Fibronic Transitions** **Why Electronic Installation?**	The student's understanding of the lesson	2 N	**Fourtee nth** **and fifteenth**

80.Infrastructure

	1 Required Textbooks
[1] Atoms, Molecules and Photons: An Introduction to Atomic, Molecular and Quantum Physics by Wolfgang Demtröder [2] ASTRONOMICAL SPECTROSCOPY; An Introduction to the Atomic and Molecular Physics of Astronomical Spectra by JONATHAN TENNYSON	2 Main References (Sources)
	Recommended books and references (scientific journals, reports,....)
	in Electronic References, Websites ....

81.Course Development Plan

Communicate in the development of the curriculum based on recent versions of books and references.

And the adoption of modern interactive means of education.

Activating matching programs with international universities to learn about modern curricula and teaching methods and exchange experiences.

Level IV Advanced Solid State Physics F428

Course Description Form

Course Description

This course description provides a brief summary of the most important characteristics of the course and the learning outcomes expected of the student to achieve and demonstrate whether they have made the most of the available learning opportunities. It should be linked to the program description.

University of Basra – College of Science	163. Educational Institution
Physics	164. Scientific Department/Center
Advanced solid-state physics	165. Course Name/Code
Bachelor, Master, PhD	166. Programs in which he enters
weekly	167. Available Forms of Attendance
2025-2024	168. Semester/Year
30 Credit Hours	169. Number of Hours (Total)
1-9-2024	170. Date this description was prepared
171. Course Objectives	
The study of advanced solid-state physics that includes the physical properties of a solid material (metals, semiconductors, insulators), so as to discuss the model of free electrons and electric current when applying an external field to the involvement of electrons in	

the calculation of specific heat. It is also an introduction to important concepts of the Fermi surface that will be used to refine the way electrical and thermal conductivity is described and processed in metals. It also illustrates the traditional model of free electron gas (classical theory), quantum theory of free electrons, the gendarmerie's state of electron gas, and the effect of the magnetic field on the motion of free electrons. Therefore, the study of the origin of beams in solids is a very important topic that helps us to understand the electrical, thermal, and optical properties of solids as well as to know the structure of beams. The explanation of the alternating electrical conductivity of a material in the presence of an alternating electric field, and this conductivity is closely related to the optical properties, covers the term "photovoltaic" at a range of frequencies that is not limited to the visible range only, but extends from the range of high frequencies to the range of low frequencies

82.Course Outcomes, Teaching, Learning and Assessment Methods

A. Cognitive Objectives

- ✓ **Introduce the student to an introduction to solid-state physics.**
- ✓ **Improving the physical properties of some materials as new metal alloys can be obtained that are characterized by high resistance to impactful loads. The electrical conductivity of some semiconductors is due to the presence of a small amount of impurities, as well as these defects cause color centers in some materials, making them suitable for many applications of technology, in addition to the association of photo-luminescence with these impurities**

b. Skill objectives of the course.

B1 – Acquire the skill of calculating the electrical conductivity of materials.

B2 - Acquire the skill of calculating the thermal conductivity of materials

Teaching and Learning Methods

1. Theoretical lectures and discussions.

2. Use of educational aids (presentations and scientific films)

Evaluation Methods

1. Daily tests and laboratory reports 2. Monthly Tests 3. Final Exams
C. Emotional and Values Goals A1- The ability to communicate information after presenting, discussing and interpreting it
Teaching and Learning Methods
1. Direct explanation and presentation of lectures. 2- **Powerpoint presentation** and screen.
Evaluation Methods
1. Daily tests and laboratory reports 2. Monthly Tests 3. Final Exams
d. Transferred general and qualifying skills (other skills related to employability and personal development). -D1- Developing the student's mental abilities

83. Course Structure					
Evaluation Method	Teaching Method	Module Name / or Subject	Required Learning Outcomes	Hours	The week
Daily and monthly tests	theoretical	**Theoretical Aspect** **Chapter One: Free Electrons in Metals** **Introduction, Drude Model: Drude Model, DC Electrical Conductivity in Metals, Specific Resistance of Metals, Electronic Thermal Conductivity of Metals.** **Chapter Two: The Quantum Theory of Free Electrons** **Introduction, Conventional Model of Free Electron Gas, Quantum Theory of Free Electrons, Fermi Surface, Fermi Energy Calculation of Metal, Electron Phase State Density, Electron Specific Heat of Metals, Effect of Fermi Surface on Electrical Conductivity, Thermal Conductivity in Metals, Motion of Electrons in the	The student's understanding of the lesson	2 N	**The first** **The second** **And the third**

		Magnetic Field, Hall's Effect. **Chapter Three: Firmness Theory in Solids** **Introduction, Beam Origin in Solids, Cyclic Potential, Bloch Function, One-Dimensional Relatable Crystal, Electron State Density, Actual Mass, Positive Gap Concept, Fermi Surface Study, Anomaly Surface Phenomenon, Orbital Frequency (Scicton), Acoustic Magnetic Phenomenon, De Haz-Van Art Phenomenon.**			
Daily and monthly tests	theoretical	**Solving the problems of chapters one, two, and three**	The student's understanding of the lesson	2 N	**Fourth Fifth and the sixth**
Daily and monthly tests	theoretical	**Semester Exam** **Theoretical Aspect** **Chapter Four: Electrical and Optical Properties of Solids** **Alternating conductivity and optical characteristics, low-frequency region**	The student's understanding of the lesson	2 N	**Seventh and eighth**

		(ωτ<<1), high-frequency region (ωτ>>1), thermal ion emission.			
Daily and monthly tests	theoretical	**Theoretical Aspect** **Solving Chapter IV Issues** **Chapter Five: Crystal Defects** **Introduction, Point Defects, Point Defects in Ionic Crystals, Shutke Spaces, Frenkel Blanks. Other types of point defects, linear defects, edge displacement, permeal dislocation, vector and Berker circuit, planar defects, defects due to packing errors, free surfaces**	The student's understanding of the lesson	2 N	**Ninth & Tenth**
Daily and monthly tests	theoretical	**Theoretical Aspect** **Other types of point defects, linear defects, edge displacement, permeal dislocation, vector and Berker circuit, planar defects, defects due to packing errors, free surfaces**	The student's understanding of the lesson	2 N	**Eleventh** **and the twelfth**
Daily and monthly tests	theoretical	**Second Semester Exam**	The student's understanding of the lesson	2 N	**Thirteenth**

Daily and monthly tests	theoret ical	**Theoretical Aspect** **Other types of point defects, linear defects, edge displacement, permeal dislocation, vector and Berker circuit, planar defects, defects due to packing errors, free surfaces**	The student's understanding of the lesson	2 N	**Fourtee nth** **and fifteenth**

84.Infrastructure

	1 Required Textbooks
1- Solid State Physics by Dr. Sobhi Saeed Al-Rawi [2] Introduction to solid state physics authorship by Charles Kittel	2 Main References (Sources)
	Recommended books and references (scientific journals, reports,....)
	in Electronic References, Websites ....

85.Course Development Plan

Communicate in the development of the curriculum based on recent versions of books and references.

And the adoption of modern interactive means of education.

Activating matching programs with international universities to learn about modern curricula and teaching methods and exchange experiences.

Level IV Advanced Mathematical Physics P415

Course Description Form

Course Description

This course description provides a concise summary of the most important characteristics of the course and the learning outcomes expected of the student to achieve and demonstrate whether they have made the most of the available learning opportunities. It must be linked to the description of the program.

University of Basra – College of Science	1. Educational Institution
Physics	2. Scientific Department/Center
Advanced Mathematical Physics P415	3. Course Name/Code
Bachelor, Master	4. Programs in which he enters
weekly	5. Available Forms of Attendance
2024-2025	6. Semester/Year
30 Credit Hours	7. Number of Hours (Total)
1-9-2024	8. Date this description was prepared
9. Course Objectives	

Identify the most important special functions (comma, beta, and error) and use them to solve a wide range of finite integrals. Solving the differential equations of Bissell and Legender and their applications in voltage problems and electromagnetic fields. Identify Laplace transforms, their inverses, theorems and use them to solve circuit problems

10.Course Outcomes, Teaching, Learning and Assessment Methods

A. Cognitive Objectives

- ✓ **Develop the student's skills in calculating different types of defined integrals using special functions.**
- ✓ **Improving the student's experience in solving differential equations**
- ✓ **Introduce the student to the importance of Laplace transformations in the analysis of electrical circuits**

b. Skill objectives of the course.

B1 – Acquire the skill of solving Lijdar and polygonal equations.

B2 - Ability to solve Laplace equations

Teaching and Learning Methods

1. Theoretical lectures and discussions.

2. Use of educational aids (presentations and scientific films)

Evaluation Methods

1. Daily tests and laboratory reports

2. Monthly Tests

3. Final Exams

C. Emotional and Values Goals

A1- The ability to communicate information after presenting, discussing and interpreting it

Teaching and Learning Methods

1. Direct explanation and presentation of lectures.

2- **Powerpoint presentation** and screen.

Evaluation Methods

1. Daily tests and laboratory reports

2. Monthly Tests

3. Final Exams

d. Transferred general and qualifying skills (other skills related to employability and personal development).

-D1- Developing the student's mental abilities

11. Course Structure					
Evaluation Method	Teaching Method	Module Name / or Subject	Required Learning Outcomes	Hours	The week
Daily and monthly tests	theoretical	**Theoretical Aspect** **Comma functions and errors.** **Beta functions.** **Solution of Bissell's differential equation.**	The student's understanding of the lesson	2 N	**The first** **The second** **And the third**
Daily and monthly tests	theoretical	**Theoretical Aspect** **Bissell functions and iterative relationships.** **Semester Exam** **Solving the Legender Differential Equation**	The student's understanding of the lesson	2 N	**Fourth Fifth** **and the sixth**
Daily and monthly tests	theoretical	**Theoretical Aspect** **Legend polynomials and generative function** **Rodriguez's formula and iterative relationships**	The student's understanding of the lesson	2 N	**Seventh and eighth**
Daily and monthly tests	theoretical	**Theoretical Aspect** **Equation of Companion Legend** **Semester Exam**	The student's understanding of the lesson	2 N	**Ninth & Tenth**
Daily and monthly tests	theoretical	**Theoretical Aspect** **Laplace Transfers** **Transfers Theorems**	The student's understanding of the lesson	2 N	**Eleventh** **and the twelfth**

Daily and monthly tests	theoretical	**Second Semester Exam**	The student's understanding of the lesson	2 N	**Thirteenth**
Daily and monthly tests	theoretical	**Theoretical Aspect** **Inverse Laplace Transform** **Solving Primary Values Problems**	The student's understanding of the lesson	2 N	**Fourteenth** **and fifteenth**

12.Infrastructure	
	1 Required Textbooks
1- Methods in Applied Mathematics by Dr. Bassel Yaqoub Yousef, University of Basra – Iraq, 1989. [2] H. J. Weber and G. B. Arfken, "Essential Mathematical Methods for Physicists", Academic Press, 2003.	2 Main References (Sources)
	Recommended books and references (scientific journals, reports,....)
	in Electronic References, Websites ....

13.Course Development Plan
Communicate in the development of the curriculum based on recent versions of books and references. And the adoption of modern interactive means of education.

Activating matching programs with international universities to learn about modern curricula and teaching methods and exchange experiences.

Level IV Statistical Physics P409

Course Description Form

Course Description

This course description provides a brief summary of the most important characteristics of the course and the learning outcomes expected of the student to achieve and demonstrate whether they have made the most of the available learning opportunities. It should be linked to the program description.

University of Basra – College of Science	10. Educational Institution
Physics	11. Scientific Department/Center
Statistical Physics F409	12. Course Name/Code
Bachelor, Master	13. Programs in which he enters
weekly	14. Available Forms of Attendance
2024-2025	15. Semester/Year
30 Credit Hours	16. Number of Hours (Total)
1-9-2024	17. Date this description was prepared
18. Course Objectives	
It aims to divide physical properties into directly measurable phenomenal and indirectly microscopic properties, and these properties are related to the movement of a large number of particles that make it impossible to use equations that describe the detailed	

motion of particles to calculate them. The task of statistical physics is to calculate the apparent properties in terms of microscopic properties without the need to make detailed calculations of the motion of these particles.

14.Course Outcomes, Teaching, Learning and Assessment Methods

A. Cognitive Objectives

- ✓ **Derivation of the distribution laws of classical and quantitative statistics.**
  Proving the principle of equal distribution of energy and applying it in calculating the specific temperature of gases
  The contribution of electrons to the specific heat of metals.
  Application of Bose-Einstein distribution to identify the properties of a superfluid and the behavior of helium, for example, as a superfluid at a temperature of less than 2.19 K

b. Skill objectives of the course.

B1 – Acquire the skill of applying the laws of distribution in calculating the rates of different physical properties .

B2- Derivation of the Fermi-Dirac distribution law and identification of the properties of the Fermi function and fermion gas.

B3- Solution of the apparent contradiction of compression and derivation of a formula for entropy at the classical end

Teaching and Learning Methods

1. Theoretical lectures and discussions.

2. Use of educational aids (presentations and scientific films)

Evaluation Methods

1. Daily tests and laboratory reports

2. Monthly Tests

3. Final Exams

C. Emotional and Values Goals

A1- The ability to communicate information after presenting, discussing and interpreting it

C2- Linking information to the environmental reality and the land system and the extent of its impact on different neighborhoods

Teaching and Learning Methods

1. Direct explanation and presentation of lectures.

2- **Powerpoint presentation** and screen.

Evaluation Methods

1. Daily tests and laboratory reports

2. Monthly Tests

3. Final Exams

d. Transferred general and qualifying skills (other skills related to employability and personal development).

-D1- Developing the student's mental abilities

D2 Define the phenotypic and microscopic properties with examples and clarify the necessity of statistical physics.

D3 Definition of bosons and fermions, identification of their properties and derivation of Bose-Einstein and boson gas distribution law.

15. Course Structure					
Evaluation Method	Teaching Method	Module Name / or Subject	Required Learning Outcomes	Hours	The week
Daily and monthly tests	theoretical	**Theoretical Aspect** **Introduction** **Maxwell-Boltzmann distribution (1)** **Maxwell-Boltzmann Distribution (2)**	The student's understanding of the lesson	2 N	**The first** **The second** **And the third**
Daily and monthly tests	theoretical	**Theoretical Aspect** **Quantitative Statistics (1)** **Quantitative Statistics (2)** **Equal Distribution of Energy**	The student's understanding of the lesson	2 N	**Fourth Fifth** **and the sixth**
Daily and monthly tests	theoretical	**Semester Exam** **Theoretical Aspect** **Statistical thermodynamics**	The student's understanding of the lesson	2 N	**Seventh and eighth**
Daily and monthly tests	theoretical	**Theoretical Aspect** **The perfect semi-classical gas** **Photonic Gas**	The student's understanding of the lesson	2 N	**Ninth & Tenth**
Daily and monthly tests	theoretical	**Theoretical Aspect** **Phononic Gas** **Electronic Gas**	The student's understanding of the lesson	2 N	**Eleventh** **and the twelfth**

Daily and monthly tests	theoretical	**Second Semester Exam**	The student's understanding of the lesson	2 N	**Thirteenth**
Daily and monthly tests	theoretical	**Theoretical Aspect** **Ionic Thermal Emission** **Bose-Einstein condensation**	The student's understanding of the lesson	2 N	**Fourteenth** **and fifteenth**

16.Infrastructure

	1 Required Textbooks
1] Introduction to statistical physics for students, A. J. Pointon.	2 Main References (Sources)
	Recommended books and references (scientific journals, reports,....)
	in Electronic References, Websites ....

17.Course Development Plan

Communicate in the development of the curriculum based on recent versions of books and references.

And the adoption of modern interactive means of education.

Activating matching programs with international universities to learn about modern curricula and teaching methods and exchange experiences.

Level IV Quantum Mechanics F401

Course Description Form

Course Description

This course description provides a concise summary of the most important characteristics of the course and the learning outcomes expected of the student to achieve and demonstrate whether they have made the most of the available learning opportunities. It must be linked to the description of the program.

University of Basra – College of Science	19. Educational Institution
Physics	20. Scientific Department/Center
Quantum Mechanics F401	21. Course Name/Code
Bachelor, Master	22. Programs in which he enters
weekly	23. Available Forms of Attendance
2024-2025	24. Semester/Year
45 Credit Hours	25. Number of Hours (Total)
1-9-2024	26. Date this description was prepared
27. Course Objectives	
The course is intended for students of the fourth stage and includes four semesters.....	

The first chapter is devoted to the study of quantum mechanics in three dimensions, and includes a detailed study of angular momentum and angular momentum itself...

The second chapter gives an extensive study of the non-time-dependent theory of disorder. With examples of calculating the energy and functions of insolvent levels and decaying levels....

The fourth chapter explains the semi-classical approximation or what is called the abbreviation (WKB), and gives a study of the classical region and the explanation of the phenomenon of quantum tunneling...

18.Course Outcomes, Teaching, Learning and Assessment Methods

A. Cognitive Objectives

- ✓ **Student Definition : Quantum Mechanics in Three Dimensions**
- ✓ **Introducing the student to Schrödinger's equation with spherical dimensions**
- ✓ **Introducing the student to the hydrogen atom**

b. Skill objectives of the course.

B1 – Acquire the skill of knowing the details of quantum mechanics.

Teaching and Learning Methods

1. Theoretical lectures and discussions.
2. Use of educational aids (presentations and scientific films)

Evaluation Methods

1. Daily tests and laboratory reports
2. Monthly Tests
3. Final Exams

C. Emotional and Values Goals A1- The ability to communicate information after presenting, discussing and interpreting it
Teaching and Learning Methods
1. Direct explanation and presentation of lectures. 2- **Powerpoint presentation** and screen.
Evaluation Methods
1. Daily tests and laboratory reports 2. Monthly Tests 3. Final Exams
d. Transferred general and qualifying skills (other skills related to employability and personal development). -D1- Developing the student's mental abilities

19. Course Structure					
Evaluation Method	Teaching Method	Module Name / or Subject	Required Learning Outcomes	Hours	The week
Daily and monthly tests	theoretical	**Theoretical Aspect** **Three-dimensional Quantum Mechanics** **Schrödinger's equation with spherical dimensions** **Hydrogen atom**	The student's understanding of the lesson	3 N	**The first** **The second** **And the third**
Daily and monthly tests	theoretical	**Theoretical Aspect** **Angular momentum and angular momentum** **The non-time-dependent theory of turbulence** **Turbulence Theory of Insoluble Levels and the Stark Stark Effect**	The student's understanding of the lesson	3 N	**Fourth Fifth** **and the sixth**
Daily and monthly tests	theoretical	**Semester Exam** **Theoretical Aspect** **Turbulence theory of dissolved levels**	The student's understanding of the lesson	3 N	**Seventh and eighth**
Daily and monthly tests	theoretical	**Theoretical Aspect** **Heterogeneity method**	The student's understanding of the lesson	3 N	**Ninth & Tenth**

Daily and monthly tests	theoretical	**Theoretical Aspect** **Theory and Applications** **Ground state of the harmonic oscillator**	The student's understanding of the lesson	3 N	**Eleventh** **and the twelfth**
Daily and monthly tests	theoretical	**Second Semester Exam**	The student's understanding of the lesson	3 N	**Thirteenth**
Daily and monthly tests	theoretical	**Theoretical Aspect** **Semi-classical approximation and classical area** **Quantum Tunnel** **Communication Formats**	The student's understanding of the lesson	3 N	**Fourteenth** **and fifteenth**

20.Infrastructure	
	1 Required Textbooks
1- Introduction to quantum mechanics (second edition) by David J. Griffiths (2005) 2- Introduction to Quantum Mechanics Dr. Hashem Aboud Qasim	2 Main References (Sources)
	Recommended books and references (scientific journals, reports,....)
	in Electronic References, Websites ....

21.Course Development Plan

Communicate in the development of the curriculum based on recent versions of books and references.

And the adoption of modern interactive means of education.

Activating matching programs with international universities to learn about modern curricula and teaching methods and exchange experiences.

Level IV Laser Physics F413

Course Description Form

Course Description

This course description provides a brief summary of the most important characteristics of the course and the learning outcomes expected of the student to achieve and demonstrate whether they have made the most of the available learning opportunities. It should be linked to the program description.

University of Basra – College of Science	28. Educational Institution
Physics	29. Scientific Department/Center
Laser Physics F413	30. Course Name/Code
Bachelor, Master	31. Programs in which he enters
weekly	32. Available Forms of Attendance
2024-2025	33. Semester/Year
45 Credit Hours	34. Number of Hours (Total)
1-9-2024	35. Date this description was prepared
36. Course Objectives	
The course aims to give the science of laser physics with a description of the basic principles of lasers and the work of lasers. Examples of phenomena to be considered are: interactions of atoms with light, different types of spectral line amplitudes, optical	

saturation, inverse enumeration, optical pumping, optical resonance and types, oscillation and amplification in lasers. The most common types of lasers will also be discussed in more detail. At the end of the course, the applications of lasers will be explained.

22.Course Outcomes, Teaching, Learning and Assessment Methods

A. Cognitive Objectives

- ✓ **Introducing the student to the laser material**
- ✓ **Essential elements of a laser**
- ✓ **Calculation of laser level equations in three and four energy levels**

b. Skill objectives of the course.

B1 – Clarification of some commonly used types of lasers

Teaching and Learning Methods

1. Theoretical lectures and discussions.
2. Use of educational aids (presentations and scientific films)

Evaluation Methods

1. Daily tests and laboratory reports
2. Monthly Tests
3. Final Exams

C. Emotional and Values Goals

A1- The ability to communicate information after presenting, discussing and interpreting it

Teaching and Learning Methods

1. Direct explanation and presentation of lectures.

2- **Powerpoint presentation** and screen.

Evaluation Methods

1. Daily tests and laboratory reports

2. Monthly Tests

3. Final Exams

d. Transferred general and qualifying skills (other skills related to employability and personal development).

-D1- Developing the student's mental abilities

23. Course Structure					
Evaluation Method	Teaching Method	Module Name / or Subject	Required Learning Outcomes	Hours	The week
Daily and monthly tests	theoretical	**Theoretical Aspect** **Essential elements of a laser** **Characteristics of the laser beam** **Interaction of Light with Matter**	The student's understanding of the lesson	3 N	**The first** **The second** **And the third**
Daily and monthly tests	theoretical	**Theoretical Aspect** **Illustrating the action of the laser in a laser system with three and four energy levels** **Calculation of laser level equations in three and four energy levels** **Types of Resonators**	The student's understanding of the lesson	3 N	**Fourth Fifth** **and the sixth**
Daily and monthly tests	theoretical	**Semester Exam** **Theoretical Aspect** **Laser Resonator Patterns** **Ray Tracking and ABCD Transition Matrices of Laser Resonance and Calculating Resonant Stability**	The student's understanding of the lesson	3 N	**Seventh and eighth**

Daily and monthly tests	theoretical	**Theoretical Aspect** **Calculating the Threshold Requirement for Laser** **Illustrate some commonly used lasers**	The student's understanding of the lesson	3 N	**Ninth & Tenth**
Daily and monthly tests	theoretical	**Theoretical Aspect** **Illustrate some commonly used lasers**	The student's understanding of the lesson	3 N	**Eleventh** **and the twelfth**
Daily and monthly tests	theoretical	**Second Semester Exam**	The student's understanding of the lesson	3 N	**Thirteenth**
Daily and monthly tests	theoretical	**Theoretical Aspect** **Some laser applications, including laser switchgear** **Switching**	The student's understanding of the lesson	3 N	**Fourteenth** **and fifteenth**

24.Infrastructure

	1 Required Textbooks
1-Laser Electronics, Third Edittion, J. T. Verdeyen 2-Laser Physics, 2010 by Milonni by O. Svelto Principles of Laser, Fifth Edition,	2 Main References (Sources)
	Recommended books and references (scientific journals, reports,....)

	in Electronic References, Websites ....

25.Course Development Plan
Communicate in the development of the curriculum based on recent versions of books and references. And the adoption of modern interactive means of education. Activating matching programs with international universities to learn about modern curricula and teaching methods and exchange experiences.

Course Description Form

1. Course Name	
Microwave	
2. Course Code	
P420	
3. Semester/Year	
2025/2026	
4. Date this description was prepared	
11/9/2025	
5. Available Forms of Attendance	
Weekly	
6. Number of study hours (total) / number of units (total)	
30 Credits/2	
7. Course administrator name (if more than one name mentioned)	
Eng. Dr. Rania Musallam Daoud	
8. Course Objectives	
• Introduce the student to the electromagnetic spectrum and waves. • Microwave properties and uses of microwave ovens. • Microwave Spread Patterns.	Course Objectives

9. Learning and teaching strategies

1- Direct explanation and lectures. 2- PowerPoint presentation and screen.	**Strategy**

10. Course Structure

Evaluation Method	Learning method	Unit or Subject Name	Required Learning Outcomes	Hours	The week
Daily and monthly checkups	theoretical	The theoretical aspect is an introduction to the electromagnetic spectrum and microwaves. Microwave Properties and Uses of Microwaves , Microwave Valves, Generators, Microwave Transmission Lines and Their Types	The student's understanding of the lesson	2. Theoretical	1,2,3
Daily and monthly checkups	theoretical	Theoretical Aspect Microwave Diffusion Patterns Transmission line analysis and equation solving and study Short circuit transmission line and open circuit transmission line.	The student's understanding of the lesson	2. Theoretical	4,5,6

Daily and monthly checkups	**theoretical**	**Semester Exam Theoretical Aspect Introduction to Waveguides, Applications, and Types of Waveguides**	**The student's understanding of the lesson**	**2. Theoretical**	**7,8**
Daily and monthly checkups	**theoretical**	**Theoretical Aspect Cross-section rectangular waveguide and wave equation solution Solve the wave equation in a cross-sectional circular waveguide. Study the difference between a circular guide and a rectangular guide.**	**The student's understanding of the lesson**	**2. Theoretical**	**9 ، 10**
Daily and monthly checkups	**theoretical**	**Theoretical Aspect Smith Chart**	**The student's understanding of the lesson**	**2. Theoretical**	**11 ، 12**
Daily and monthly checkups	**theoretical**	**Second Semester Exam**	**The student's understanding of the lesson**	**2. Theoretical**	**13**

Daily and monthly checkups	**theoretical**	**Theoretical Aspect Microwave Paths and Microwave Propagation Fresnel area and distortion agent**	**The student's understanding of the lesson**	**2. Theoretical**	**15،14**

11. Course Evaluation

1- Daily tests and laboratory reports.
2. Monthly tests.
3- Final exams.

12. Learning and Teaching Resources

Main References (Sources)	Required Books for the Rapporteur
A- Recommended Books and References (Scientific Journals and Reports,...)	1- Introduction to Microwave Theory by H.A. Atwater
B- Electronic References and Websites...	2- The Microwave Engineering Foundation by R.E. Cullen
	3- Transmission lines and networks by Waldersi Johnson.