Academic Program Description Form

University Name: Al Nahrain University

Faculty/Institute: College .of Science

Scientific Department: Physics

Academic or Professional Program Name: B.Sc in Physics, higher education

Final Certificate Name: B.Sc,MSc,Ph.D

Academic System: Semester

Description Preparation Date: 2024-2025

File Completion Date: 2024

Signature: Saad N. Abood

Head of Department Name:

Prof.Dr Saad Naji Abood

Date: 2024/10/16

Signature:

Scientific Associate Name:

Manaf Adnan Salch

Date: 29/10/2024

The file is checked by: Ghada Madhun

Department of Quality Assurance and University Performance

Director of the Quality Assurance and University Performance Department:

Date:

Signature:

Approval of the Dean

Academic Program Description Form

University Name: **Al Nahrain University**

Faculty/Institute: **College .of Science**

Scientific Department: **Physics**

Academic or Professional Program Name: **B.Sc in Physics, higher education**

Final Certificate Name: **B.Sc,MSc,Ph.D**

Academic System: **Semester**

Description Preparation Date: **2024–2025**

File Completion Date: **2024**

Signature:
Head of Department Name:
Prof.Dr Saad Naji Abood
Date: **2024/10/16**

Signature:
Scientific Associate Name:
Date:

The file is checked by:

Department of Quality Assurance and University Performance

Director of the Quality Assurance and University Performance Department:

Date:

Signature:

Approval of the Dean

1. Program Vision

The student's ability to understand and apply a variety of physical, and acquire the ability to explain and understand many of the physical processes.

2. Program Mission

Qualifying students practically and scientifically through an intensive scientific curriculum of teaching and learning methods and preparing the student in an academic way that is compatible with the necessities of scientific development. Preparing distinguished students in the field of scientific research who hold graduate studies.

3. Program Objectives

Increasing the efficiency of students and raising their level of knowledge so that they are qualified to work in various state departments so that they can be effective and distinguished elements in their fields of work and scientific research.

4. Program Accreditation

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

From the Association of Arab Universities

5. Other external influences

Is there a sponsor for the program?

Ministry of Higher Education and Scientific Research

6. Program Structure

Program Structure	Number of Courses	Credit hours	Percentage	Reviews*
Institution Requirements	2		100	

College Requirements	2		100	
Department Requirements	2		100	
Summer Training	–		–	
Other				

* ممكن ان تتضمن الملاحظات فيما اذا كان المقرر أساسي او اختياري .

7. Program Description

Credit Hours		Course Name	Course Code	Year/Level
practical	theoretical			B.Sc
2	2	Material physics I	PHY	الثالثة
	2	Geometrical Optics	PHY	الثالثة
	2	Quantum mechanics I	PHY	الثالثة
	2	Methodology	PHY	الثالثة
	2	Laser physics I	PHY	الثالثة
	2	Optional Semiconductors	PHY	الثالثة
2	2	Numerical methods of physics	PHY	الثالثة
	2	Optional Sustainable Energy	PHY	الثالثة
	2	Electromagnetic theory II	PHY	الثالثة
	2	Mathematical physics	PHY	الثالثة
2	2	Electronics II	PHY	الثالثة
2	2	Numerical methods	PHY	الثالثة
	2	Quantum mechanics II	PHY	الثالثة
	2	Arabic language	PHY	الثالثة
2	2	Laser physics I	PHY	الرابعة
2	2	Solid state physics I	PHY	الرابعة
	2	Advanced Medical physics	PHY	الرابعة
	2	Nanotechnology	PHY	الرابعة
2	2	Nuclear physics I	PHY	الرابعة
2	2	Laser physics II	PHY	الرابعة
2	2	Solid state physics II	PHY	الرابعة
2	2	Nuclear physics II	PHY	الرابعة
	2	Advanced Medical physics	PHY	الرابعة
2	2	Solar physics	PHY	الرابعة

8.Expected learning outcomes of the program

Knowledge	
Learning Outcomes 1	The student acquires the ability to explain and understand many of the biological processes in primary and graduate studies that serve the labor market and scientific research.
Skills	
Learning Outcomes 2	Preparing students who are scientifically empowered in the field of specialization and the labor market.
Learning Outcomes 3	Identifying the most important advanced scientific and research materials that serve the fields of communications and modern technology.
Ethics	
Learning Outcomes 4	Ability to apply principles of physics.
Learning Outcomes 5	The ability to solve scientific problems and find possible alternatives to those solutions.

9.Teaching and Learning Strategies

1. Solve various problems in different physics applications.
2. Giving homework to increase students' ability in problem-solving techniques.
3. Promote quick student response by asking conceptual questions during class.
4. Encouraging students in strategies to solve examples in class.
5. Encouraging students to publish research in graduate studies.
6. Encouraging students to use modern, advanced applications in the field of specialization.

10.Evaluation methods

1. Seminar.
2. Oral exams.
3. Quizzes.
4. Direct questions.
5. Homework.

6. Reports

11. Faculty

Faculty Members

Number of the teaching staff		Special Requirements/Skills (if applicable)		Specialization		Academic Rank	
lecture	staff			Special	General		
	1			فيزياء طبية	علوم الفيزياء	استاذ دكتور	أ.د.اسماء هادي محمد
	1			بصريات	علوم الفيزياء	استاذ دكتور	أ.د.سهى موسى خورشيد
	1			بصريات الكترون	علوم الفيزياء	استاذ دكتور	أ.د.عدي علي حسين
	1			صلبة	علوم الفيزياء	استاذ دكتور	أ.د.احمد عبد الرحمن
	1			فيزياء نظرية	علوم الفيزياء	استاذ دكتور	أ.د.سعد ناجي عبود
	1			صلبة	علوم الفيزياء	استاذ دكتور	أ.د.عماد خضير عباس
	1			معالجة صور رقمية	علوم الفيزياء	استاذ دكتور	أ.د.ليث عبد العزيز عباس
	1			بلازما	علوم الفيزياء	استاذ دكتور	أ.د.خالد عباس يحيى
	1			فلك	علوم الفيزياء	استاذ مساعد دكتور	أ.م.د.جزيل حسين
	1			بلازما	علوم الفيزياء	استاذ مساعد دكتور	أ.م.د.حسن ناصر
	1			صلبة	علوم الفيزياء	استاذ مساعد دكتور	أ.م.د.وسن علي موسى
	1			اشعاعية	علوم الفيزياء	استاذ مساعد دكتور	أ.م.د.مروة عبد المحسن
	1			احصائية	علوم الفيزياء	استاذ مساعد دكتور	أ.م.د ابراهيم عبدالمهدي
	1			بلازما	علوم الفيزياء	استاذ مساعد دكتور	ا.م.د.نيسان سعود
	1			صلبة	علوم الفيزياء	استاذ مساعد دكتور	ا.م.د سديم عباس
	1			نظرية	علوم الفيزياء	مدرس دكتور	م.د.احمد شاكر
	1			بصريات	علوم الفيزياء	استاذ مساعد	أ.م.نور محمد حسن
	1			نظرية	علوم الفيزياء	مدرس دكتور	م.د.عمر اياد
	1			فلك	علوم الفيزياء	مدرس دكتور	م.د.سلام اسماعيل
	1			الكترونيك	علوم الفيزياء	استاذ مساعد دكتور	أ.م.د.زينب منذر

أ.م.د.احمد صبيح	استاذ مساعد دكتور	علوم كيمياء	كيمياء			1	
م.د.فاطمة عبد الصاحب	مدرس دكتور	علوم رياضيات	رياضات			1	
م.عمر عدنان	مدرس	شريعة	شريعة			1	
م.د.منى صالح	مدرس دكتور	علوم رياضيات	رياضيات			1	
م.د.احمد نعمة	مدرس دكتور	اللغة عربية	اللغة العربية			1	
ا.م.ابتسانم كامل	استاذ مساعد	علوم الرياضيات	رياضيات			1	
م.د.ايمان عبد الوهاب	مدرس دكتور	علوم رياضيات	رياضيات			1	
م.د.احمد ايوب	مدرس دكتور	علوم رياضيات	رياضيات			1	

Professional Development
Mentoring new faculty members
Assess teaching techniques and give the students surveys about those techniques.
Professional development of faculty members
Involve the new staff in teaching process and encourage them to develop the lecture with the supervision of the main lecturer.

12.Acceptance Criterion

(Setting regulations related to enrollment in the college or institute, whether central admission or others)

13.The most important sources of information about the program

دليل اتحاد الجامعات العربية "ضمان الجودة والاعتماد للبرامج الاكاديمية في كليات الجامعات العربية الامانه العام /عمان/الاردن/2022

14.Program Development Plan

Involve more high level books and upgrade the lectures each year.

Program Skills Outline																
Required program Learning outcomes																
Ethics				Skills				Knowledge				Basic or optional	Course Name	Course Code	Year/Level	
C4	C3	C2	C1	B4	B3	B2	B1	A4	A3	A2	A1					
								✔	✔	✔	✔	اساسى	Atomic physics	PHY	مرحلة ثالثة	بكالوريوس
								✔	✔	✔	✔	اساسى	Plasma physics	PHY	مرحلة ثالثة	
								✔	✔	✔	✔	اساسى	Quantum mechanics I	PHY	مرحلة ثالثة	
								✔	✔	✔	✔	اختياري	Methodology	PHY	مرحلة ثالثة	
								✔	✔	✔	✔	اساسى	Electromagnetic theory I	PHY	مرحلة ثالثة	
								✔	✔	✔	✔	اساسى	Medical physics I	PHY	مرحلة ثالثة	
								✔	✔	✔	✔	اساسى	Electronics I	PHY	مرحلة ثالثة	
								✔	✔	✔	✔	اساسى	Molecular physics	PHY	مرحلة ثالثة	

								✔	✔	✔	✔	اساسی	Electromagnetic theory II	PHY	مرحلة ثالثة	
								✔	✔	✔	✔	اساسی	Mathematical physics	PHY	مرحلة ثالثة	
								✔	✔	✔	✔	اساسی	Electronics II	PHY	مرحلة ثالثة	
								✔	✔	✔	✔	اساسی	Numerical methods	PHY	مرحلة ثالثة	
								✔	✔	✔	✔	اساسی	Quantum mechanics II	PHY	مرحلة ثالثة	
								✔	✔	✔	✔	اساسی	Arabic language	PHY	مرحلة ثالثة	بكالوريوس
								✔	✔	✔	✔	اساسی	Laser physics I	PHY	مرحلة رابعة	
								✔	✔	✔	✔	اساسی	Solid state physics I	PHY	مرحلة رابعة	
								✔	✔	✔	✔	اساسی	Medical physics II	PHY	مرحلة رابعة	
								✔	✔	✔	✔	اساسی	Nanotechnology	PHY	مرحلة رابعة	
								✔	✔	✔	✔	اساسی	Nuclear physics I	PHY	مرحلة رابعة	
								✔	✔	✔	✔	اساسی	Laser physics II	PHY	مرحلة رابعة	
								✔	✔	✔	✔	اساسی	Solid state physics II	PHY	مرحلة رابعة	

مرحلة رابعة	PHY	Nuclear physics II	اساسى	✔	✔	✔	✔									
مرحلة رابعة	PHY	Advanced Medical physics	اساسى	✔	✔	✔	✔									
مرحلة رابعة	PHY	Solar physics	اساسى	✔	✔	✔	✔									

- **يرجى وضع اشارة في المربعات المقابلة لمخرجات التعلم الفردية من البرنامج الخاضعة للتقييم**

Course Description Form

1. Course Name:
Laser physics (1)
2. Course Code:
3. Semester / Year:
2025_2024
4. Description Preparation Date:
2024
5. Available Attendance Forms:
Attending
6. Number of Credit Hours (Total) / Number of Units (Total)
10 hours per week (4 theoretical + 6 practical)
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Wildan Wohammed Awad Email: wildan.awad@nahrainuniv.edu.iq 1-zainab hazem shakir 2-zena kumel abduldin 30zahraa salman abdulamer
8. Course Objectives

Course Objectives	• **Teaching the student the basics of laser physics** • **Teaching the student to write special reports for the laboratory.** • **Teaching the student the properties of the laser beam and the possibility of entering the applied fields**

9. Teaching and Learning Strategies

Strategy	)iscuss the topics of the methodological book and auxiliary eferences Theoretical lectures including problem solutions and discussion of homework Ask students a set of thinking questions during lectures for specific topics. Giving students homework that requires .finding self-solutions

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1.	10	Study the Black Body Radiation	Black Body Radiation		
2.	10	Photon interaction with matter	Absorption , Spontaneous Emission, Stimulated Emission		
3.	10	The low Transitions	Forbidden and Allowed Transitions		
4.	10	Understand the Rate of Stimulated Emission and Absorption	Rate of Stimulated Emission and Absorption		
5.	10	Gain Coefficient, Absorption Cross Section	Gain Coefficient, Absorption Cross Section		
6.	10	Understand Einstein's Calculations	Einstein's Calculations		
7.	10	The different between Maser and Laser	Idea of Maser and Laser		
8.	10	Understand Laser Principles	Principles of Laser		
9.	10	How to find Gain Coefficient and Threshold Condition	Gain Coefficient and Threshol Condition		
10.	10	Pumping Plan and Methods	Pumping Plan and Methods		
11.	10	Types of Optical Resonators	Types of Optical Resonators		
12.	10	Resonator Optical of Stability	Resonator Optical of Stability		
13.	10	Understand Resonator Mods	Resonator Mods		
14.	10	Calculate Quality Factor	Quality Factor		
15.	10	Continuous wave and pulse operation	Pulsed and continuous laser output types		

11. Course Evaluation

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

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	
Main references (sources)	Fundemantial of laser physics (200
Recommended books and references (scientific journals, reports…)	Principles of laser (o.svelto 1989)

Electronic References, Websites	

Course Description Form

1. Course Name:
Numerical Analysis
2. Course Code:
PHYS3205
3. Semester / Year:
First Semester / 2024-2025
4. Description Preparation Date:
20 / 10 / 2024
5. Available Attendance Forms:
By presence
6. Number of Credit Hours (Total) / Number of Units (Total)
3
7. Course administrator's name (mention all, if more than one name)
Names: Dr. Omar Ayad Jalal Email: omar.jalal@nahrainuniv.edu.iq Bilal Abdulsattar Yousif Email: belal.alshekhly@nahrainuniv.edu.iq Saif Muhammed Jasim Email: saif.muhammed@nahrainuniv.edu.iq
8. Course Objectives

Course Objectives	• **Teaching students the basics of numerical analysis.** • **Teaching the student to write advanced programs in the MATLAB language, specifically for numerical methods.** • **Teaching the student to solve some physical and engineering problems using numerical analysis.**
9. Teaching and Learning Strategies	
Strategy	• Discussing the topics of the methodological book and auxiliary references • Theoretical lectures including problem solving and discussion of homework • Asking students for a set of thinking questions during lectures on specific topics.

	• Giving students homework that requires finding solutions on their own.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Graphical method	Graphical method	Theoretical and Experimental	Oral and written exam
2	2	Bisection method	Bisection method	Theoretical and Experimental	Oral and written exam
3	2	Fixed Point method	Fixed Point method	Theoretical and Experimental	Oral and written exam
4	2	Newton-Raphsen method	Newton-Raphsen method	Theoretical and Experimental	Oral and written exam
5	2	Gauss Elimination method	Gauss Elimination method	Theoretical and Experimental	Oral and written exam
6	2	Gauss-Seidal method	Gauss-Seidal method	Theoretical and Experimental	Oral and written exam
7	2	Least Square Fitting	Least Square Fitting	Theoretical and Experimental	Oral and written exam
8	2	Trapezoidal Rule	Trapezoidal Rule	Theoretical and Experimental	Oral and written exam
9	2	Simpson's method I	Simpson's method I	Theoretical and Experimental	Oral and written exam
10	2	Simpson's method II	Simpson's method II	Theoretical and Experimental	Oral and written exam
11	2	Euler's method	Euler's method	Theoretical and Experimental	Oral and written exam
12	2	Runge- Kutta method I	Runge- Kutta method I	Theoretical and Experimental	Oral and written exam
13	2	Runge- Kutta method II	Runge- Kutta method II	Theoretical and Experimental	Oral and written exam
14	2	Solution of non-linear system (Newton's method)	Solution of non-linear system (Newton's method)	Theoretical and Experimental	Oral and written exam

15	2	Solution of non-linear system (iteration method)	Solution of non-linear system (iteration method)	Theoretical and Experimental	Oral and written exam

11. Course Evaluation

- Daily tests 10%
- Monthly exams 80%
- Homework assignments and student interaction in discussion sessions 10%

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	ESSENTIAL MATLAB (For Engineers and Scientists), 3rd edition (2007), Brain D. Hahan *and* Danial T. Valentine.
Main references (sources)	• Getting Started with MATLAB 7, The MathWorks (2007). MATLAB Primer (Seventh Edition 2005),Timothy A. Davies *and* Kermit Sigmon.
Recommended books and references (scientific journals, reports…)	----------
Electronic References, Websites	www.mathwork.com

Course Description Form

1. Course Name:
Sustainable Energy
2. Course Code:
PHYS
3. Semester / Year:
First Semester / 2024−2025
4. Description Preparation Date:
20 / 09 / 2024
5. Available Attendance Forms:
By presence
6. Number of Credit Hours (Total) / Number of Units (Total)
2
7. Course administrator's name (mention all, if more than one name)
Names: Assist. Proff. Ahmed Kadhim Al-Lami Email: Ahmed.kadhim@nahrainuniv.edu.iq
8. Course Objectives

Course Objectives	• **Teaching students the basics of sustainable Energy.** • **Teaching the student to deal with new scientific understanding of the renewable energy** • **Teaching the student to find out why to deal with new sources of energy and its problems**
9. Teaching and Learning Strategies	
Strategy	• Discussing the topics of the methodological book and auxiliary references • Theoretical lectures including problem solving and discussion of homework • Asking students for a set of thinking questions during lectures on specific topics. • Giving students homework that requires finding solutions on their own.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Find out the total energy	Total Energy Usage	Theoretical and Experimental	Oral and written exam
2	2	Understanding	what is Energy?	Theoretical	Oral and written exam
3	2	Know about resources of energy	Energy Resources	Theoretical	Oral and written exam
4	2	Wind energy	Calculation of Wind Energy and Power	Theoretical	Oral and written exam
5	2	Renewable energies	Applications of Renewable Energies	Theoretical	Oral and written exam
6	2		Mid-term exam	Theoretical	
7	2	photovoltaic	Photovoltaic	Theoretical	Oral and written exam
8	2	Solar radiation	Solar Radiation	Theoretical	Oral and written exam
9	2	Solar power understanding	Solar Power	Theoretical	Oral and written exam
10	2	atmosphere	Atmosphere Influence on Solar Radiation	Theoretical	Oral and written exam
11	2	What is geothermal	Geothermal Resources	Theoretical	Oral and written exam
12	2		Resource Identification	Theoretical	Oral and written exam
13	2	How to calculate the geothermal power	Geothermal Power Technology	Theoretical	Oral and written exam
14	2	What is binary scale	Binary-Scale	Theoretical	Oral and written exam

15	2		Mid-Term Exam		

11. Course Evaluation

- Daily tests 10%
- Monthly exams 80%
- Homework assignments and student interaction in discussion sessions 10%

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Sustainable energy textbook
Main references (sources)	Renewable ewnergy
Recommended books and references (scientific journals, reports…)	----------
Electronic References, Websites	

Course Description Form

1. Course Name :semiconductors

2. Course Code:

3. Semester / Year:2024_2025

4. Description Preparation Date:

5. Available Attendance Forms:

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

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

Name: alaajaarghazai
Email: dr.alaa.ghazai2nahraianuniv.edu.iq

8. Course Objectives

Course Objectives	• ..... • ..... • .....

9. Teaching and Learning Strategies

Strategy	

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
2 3 4 5 6 7			Energy Band and Carrier Concentratic in Thermal Equilibrium		

8 9 1 1 1 1 1 1			Semiconduct Materials Basic Crysta Structures Valence Bon Energy Banc Intrinsic Carrier Concentratic Donors and Acceptors Carrier Transport Phenomena Carrier Drift Carrier Diffusion Generation and Recombinati Processes Continuity Equation Thermionic Emission Process Tunneling Process Space-Charg Effect High-Field Effects p-n Junction 82 Thermal Equilibrium Condition Depletion Region Depletion Capacitance Current-		

			Voltage Characteristi Charge Stora and Transier Behavior Junction Breakdown Heterojuncti		

11. Course Evaluation

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

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	
Main references (sources)	3RD EDITION Semiconductor Devices Physics and Technolog M. SZE and M. K. LEE JOHN WILEY & SO INC.2010
Recommended books and references (scientific journals, reports…)	Semiconductor Physics and Devices B Principles Third Edition Donald A. Nea Univer.\ip of New Mexico
Electronic References, Websites	

TEMPLATE FOR COURSE SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

COURSE SPECIFICATION

This Course Specification provides a concise summary of the main features of the course and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It should be cross-referenced with the programme specification.

1. Teaching Institution	Dr. Suha Mousa Alawsi Working in lab 1-Ruaa Tahseen 2-Ghufran Mohammed 3-Zena mowafaq
	Alnahrain university /college of Science /physics
3. Course title/code	Geomatrical optics
4. Modes of Attendance offered	
5. Semester/Year	FIRST /2024-2025
6. Number of hours tuition (total)	9 h
7. Date of production/revision of this specification	10/10/2024
8. Aims of the Course	
1. Teaching the student the basics of optics. 2- Teaching the student how to use the practical experiences of optics and linking them to the theoretical side	

9· Learning Outcomes, Teaching ,Learning and Assessment Methode

A- Cognitive goals .

A1- Enable students to know the most important Arab and foreign scientists in Optics

A2- Enable students to understand how to use some visual effects such as interference and polarization.

A 3- Enable students to analyze the resulting images.

A4- Enable the student to simulate some physical systems such as the eye, telescopes, cameras and communications

.

B. The skills goals special to the course.

B1 - Practical skills

B2 - Reminding and Analyzing Skills

B3 - Use and development skills.

Teaching and Learning Methods

-Discussing the topics of the curriculum book and the auxiliary references
-Theoretical lectures including problem solving and discussion of homework
-Asking students a set of thinking questions during the lectures for specific topics.
-Giving students homework that requires finding self-solutions

Assessment methods

-daily tests
-Monthly exams
-Homework and student interaction in discussion sessions
- Making scientific reports for the lesson topics

C. Affective and value goals

C1 - Enable students to write scientific reports in various scientific fields.

C2 - Enable students to simulate physical systems by finding appropriate solutions to the problems that appear in these systems.

C3- Enabling students to understand and analyze the results with a view to benefiting from it in any field of scientific research

D. General and rehabilitative transferred skills(other skills relevant to employability and personal development)

- Follow up on scientific development by communicating with international universities via the Internet
-Participation in scientific conferences inside and outside the country
- Participation in workshops and scientific symposia inside and outside the country

.

10. Course Structure					
Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1	9h		Introduction	Pract+theor	Daily and monthly Exam
2	9h		Refraction	Pract+theor	Daily and monthly Exam
3	9h		Low of refraction	Pract+theor	Daily and monthly Exam
4	9h		Reflection	Pract+theor	Daily and monthly Exam
5	9h		Low of reflection	Pract+theor	Daily and monthly Exam
6	9h		Lenses	Pract+theor	
7	9h		Thin lenses	Pract+theor	
8	9h		Thick lenses	Pract+theor	Daily and monthly Exam
9	9h		Mirror	Pract+theor	Daily and monthly Exam
10	9h		Prism	Pract+theor	Daily and monthly Exam
11	9h		Ray tracing of paraxial ray	Pract+theor	Daily and monthly Exam
12	9h		Ray tracing meridinal ray	Pract+theor	Daily and monthly Exam
13	9h		Aberration	Pract+theor	Daily and monthly Exam
14	9h		Types of aberrations	Pract+theor	Daily and monthly Exam
15	9h		Selected Examples III	Pract+theor	Daily and monthly Exam

11. Infrastructure	
1. Books Required reading:	Fundamental of optics , janckes 1986 ➢ Supplementary Books: ✓ Optical engineering , smith. First edition, 1998 ✓ Optical engineering , smith. second edition, 2007
2. Main references (sources)	www.opticka.com

A- Recommended books and references (scientific journals, reports…).	
B-Electronic references, Internet sites…	

12. The development of the curriculum plan

Course Description Form

1. Course Name:

Materials Physics

2. Course Code:

3. Semester / Year:

First/ 2024

4. Description Preparation Date:

21/10/2024

5. Available Attendance Forms:

Physical attendance

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

2 hours weekly (30 total)/ 2 units

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

Name: Assist. Prof. Dr. Sadeem Abbas Fadhil
Email: sadeemfadhil@yahoo.com

8. Course Objectives

Course Objectives	• **Understanding Physical Properties**: Enabling students to understand the physical properties of different materials, such as density, hardness, and elasticity. • **Applying Theoretical Concepts**: Connecting theoretical concepts in physics to practical applications in everyday life and industry. • **Developing Analytical Skills**: Enhancing analytical and critical thinking skills through the study of material behavior under various conditions. • **Encouraging Innovation**: Inspiring students to innovate in the design and application of materials, supporting research and development in fields like engineering and materials science. • **Understanding Chemical and Physical Changes**: Studying how changes in environmental conditions affect the properties of materials.

	• **Interacting with Technology**: Enhancing students' understanding of how modern technology is used in the study and application of materials science.

9. Teaching and Learning Strategies

Strategy	• **Lectures and Interactive Discussions**: Use lectures to introduce key concepts, followed by discussions to encourage student engagement and clarify doubts. • **Case Studies**: Analyze real-world applications and case studies to show how materials physics is applied in industry, engineering, and technology. • **Group Projects**: Encourage collaborative learning through group projects that focus on designing or testing new materials, fostering teamwork and problem-solving skills. • **Simulations and Modeling**: Use computer simulations to visualize complex concepts and predict material behavior under different conditions. • **Flipped Classroom**: Assign readings or video lectures for students to review at home, freeing up class time for discussions, problem-solving, and hands-on activities. • **Guest Lectures and Industry Visits**: Invite professionals from the materials science field or organize visits to relevant industries to provide real-world insights. • **Problem-Based Learning**: Present students with real-life problems related to materials and encourage them to propose solutions based on their understanding of physics principles. • **Peer Teaching**: Allow students to teach certain topics to their peers, reinforcing their own understanding and enhancing communication skills. • **Assessment and Feedback**: Use varied assessment methods, including quizzes, lab reports, and presentations, to gauge understanding and provide timely feedback.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Give the students a general idea about the subject.	Introduction	Whiteboard	Oral and written exams
2	2	Make the student able to understand	Atomic Bonding of Materials	Whiteboard	Oral and written exams

		the Atomic Bonding of Materials			
3		Make the student able to understand forces and energy between atoms	Forces and energy between atoms		Oral and written exams
4	2	Make the student able to understand the structure of solids.	Structure of Solids	Whiteboard	Oral and written exams
5	2	Make the student understand the crystal defects and their effects on the properties of the materials.	Crystal Defects	Whiteboard	Oral and written exams
6	2	exam	Mid exam 1	Whiteboard	Oral and written exams
7		Learning about crystal lattice systems	Crystal lattice systems		
8	2	Learning about the Mechanical Properties of Materials	Mechanical Properties of Materials	Whiteboard	Oral and written exams
9	2	Learning about the Electrical Properties of Materials	Electrical Properties of Materials	Whiteboard	Oral and written exams
10	2	Learning about the thermal Properties of Materials	Thermal Properties of Materials	Whiteboard	Oral and written exams
11	2	Learning about the Magnetic Properties of Materials	Magnetic and Properties of Materials	Whiteboard	Oral and written exams
12	2	Learning about the Optical Properties of Materials	Optical Properties of Materials	Whiteboard	Oral and written exams
13	2	Discussing reports	Reports discussion	Whiteboard	Oral and written exams
14	2	Make the students learn about different materials applications	Materials applications	Whiteboard	Oral and written exams
15	2	Preparation for final exam	Preparation for final exam	Whiteboard	Oral and written exams

11. Course Evaluation

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

-Daily exams and attendance 10 Marks -Mid term exams 25 Marks -Home works and reports 5 Marks - Final exam 60 Marks

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Fundamentals of Materials Science and Engineering: An Integrated Approach By: WILLIAM D. CALLISTER, JR. & DAVID G. RETHWISCH, 2015 John Wiley & Sons, Inc.
Main references (sources)	Introduction to Solid State Physics, by Kittel 2005
Recommended books and references (scientific journals, reports…)	MIT lectures about materials
Electronic References, Websites	Internet websites, Like edx and others.

Course Description Form

1. Course Name:

Quantum Mechanics 1

2. Course Code:

3. Semester / Year:

First Semester/ Third Year Students

4. Description Preparation Date:

01/09/2024

5. Available Attendance Forms:

1. Classroom Lectures
2. Electronic Classroom

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

4 Hrs. a week (60 Hrs. Total) / 4 untis

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

Name: Ibrahim Abdelmahdi Sadiq
Email: ibrahim.sadiq@nahrainuniv.edu.iq

8. Course Objectives

Course Objectives	• To know the origins of the Quantum Mechanics **(QM)** • To realize the basic concepts and principles of q**(QM)**. • To have the ability to understand the applications of **(QM)**. • To have skills necessary to solve problems concerning QM and its applications. • The student is able to study advanced programs in QM. • The student is also able to understand other physics programs that requires the knowle and skills quantum mechanics program provides.

9. Teaching and Learning Strategies

Strategy	• Classroom Attendance • Exercises and solved problems. • Home Assessments (Solving problems and Reports) • Seminars

10. Course Structure

Week	Hrs.	Required Learning Outcomes	Unit title / Subjective	Learning method	Evaluation method
1	4		**The Origins of QM**	Classroom lecture	
2	4		**Historic Developments of QM**	Classroom lecture	
3	4		**Basic Concepts and Principles of QM**	Classroom lecture	
4	4		**The Basic Postulates of QM**	Classroom lecture	
5	4		**The Basic Postulates of QM**	Classroom lecture	
6	4		**Some Applications of TDSE**	Classroom lecture	
7	4		**Applications of TISE:THE FREE PARTICLE**	Classroom lecture	
8	4		**The Step Potential**	Classroom lecture	
9	4		**The Potential Barrier**	Classroom lecture	

10	4		**The 1D Box Potential**	Classroom lecture	
11	4		**The 3D Box Potential**	Classroom lecture	
12	4		**The 1D Harmonic Oscillator**	Classroom lecture	
13	4		**The 3D Harmonic Oscillator**	Classroom lecture	
14	4		**The Ladder Operators**	Classroom lecture	
15	4		**Review**	Classroom lecture	
				Classroom lecture	

11. Course Evaluation

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

Daily Oral (5 Marks)
Quizzes (10 Marks)
Home Assignment (Solving problems and Reports) (5 Marks)
Midterm Exam (20 Marks)

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	
Main references (sources)	1. Fundamentals of Quantum Mechanics, Ajit Kumar, Cambridge University Press. First published 2018. 2. Introduction to Quantum Mechanics, A. C. Phillips Department, John Wiley & Sons Ltd, 2003. 3. Quantum Mechanics Concepts and Applications Second Edition, Nouredine Zettili, John Wiley & Sons, Ltd. 2009. 4. Introduction to Quantum Mechanics Second Edit David J. Griffiths, Pearson Education. Inc. 2005
Recommended books and references (scientific journals, reports…)	• Introduction to Quantum Mechanics by Dicke and Wittke • An Introdution to Theory of Quantum Mechanics and Applications by Amnon Yariv • Solved Problems in Quantum Mechanics (Schaum's Outlines Series)
Electronic References, Websites	

Course Description Form

1. Course Name:
Solid State Physics I
2. Course Code:
PHYS4102
3. Semester / Year:
1st course / 4th year
4. Description Preparation Date:
1/9/2024
5. Available Attendance Forms:
In person or Online
6. Number of Credit Hours (Total) / Number of Units (Total)
6 hours weekly (3 H theoretical + 3 H practical)
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Mohammed Tariq Email: Mohammed.albaidhani@nahrainuniv.edu.iq

8. Course Objectives	
Course Objectives	• Teach the student the basic concepts of solid state physics. • Providing the student with the skills to discuss and solve applied problems related to solid state physics. • Linking theoretical concepts with practical applications.

9. Teaching and Learning Strategies	
Strategy	• Discussing the topics of the methodological book and auxiliary references • Theoretical lectures including problem solving and discussion of homework • Asking students for a set of thinking questions during lectures on specific topics. • Giving students homework that requires finding solutions on their own.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Learning	Introduction	Theoretical	Oral and writ
2	3	Learning	Condensed matter	Theoretical	Oral and written

3	3	Learning	Crystal structure Primitive cell	Theoretical	Oral and written
4	3	Learning	Bravais lattice Primitive Wigner Seitz	Theoretical	Oral and written
5	3	Learning	Amorphous, poly and single phases	Theoretical	Oral and written
6	3	Learning	Symmetry operation	Theoretical	Oral and written
7	3	Learning	Lattice types and Miller Indices	Theoretical	Oral and written
8	3	Learning	Inter planer distance	Theoretical	Oral and written
9	3	Learning	Properties of cubic systems	Theoretical	Oral and written
10	3	Learning	Planes in Hexagonal crystal	Theoretical	Oral and written
11	3	Learning	Direction in crystal	Theoretical	Oral and written
12	3	Learning	Filling factor	Theoretical	Oral and written
13	3	Learning	Some structures diamond, Nacl, ZnS	Theoretical	Oral and written
14	1	Learning	Test	Theoretical	Oral and written
15	3	Learning	Summary	Theoretical	Oral and written
16	3	exam	Final Examination	Theoretical	Oral and written

11. Course Evaluation

40 points (10 laboratory + 10 homework + 20 mid exam)
60 points (10 laboratory exam + 50 final exam)

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	1. Introduction to Solid State Physics (Wiley, Global Edition) By: Charles Kittel ISBN: 978-1-119-45620-9 (August 2018) (712 Pages). 2. Introduction to Solid State Physics (Wiley, India Edition) By: Charles Kittel ISBN-13: 978-8-126-57843-6 (2019) (712 Pages).
Main references (sources)	Solid State Physics (Revised Edition, Cengage Learning Asia Pte Ltd) By: Neil W. Ashcroft ISBN-13: 978-981-4369-89-3 (2016) (1294 Pages).
Recommended books and references (scientific journals, reports…)	Einfuhrung in die Festkorperphysik (6th Edition, Teubner GmbHWiesbaden) By: K. Kopitzki ISBN:978-3-8351-0144-9 (2007) (483 Pages).
Electronic References, Websites	Any website with the above titles. View solid state physics courses at reputable universities.

Solid State Physics Laboratory:

1. Assistant Lecturer Wsan Ali Khudair
2. Assistant Lecturer Zina Mowafaq Qaddouri
3. Assistant Lecturer Norhan Sabah Juma'a
4. Assistant Lecturer Mais Atallah Wahsh

Course Description Form

1. Course Name:
Laser physics (1)
2. Course Code:
3. Semester / Year:
2024-2025
4. Description Preparation Date:
2024
5. Available Attendance Forms:
Attending
6. Number of Credit Hours (Total) / Number of Units (Total)
8 hours per week (3 theoretical + 6 practical)
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Narjis Zamil Abdulzahra Email: narjis.zamil@nahrainuniv.edu.iq
8. Course Objectives

Course Objectives	**1. Understand Laser Principles: Grasp the fundamental concepts of stimulated emission, population inversion, and the workings of different types of lasers.** **2. Analyze Laser Systems: Analyze the structure and functioning of laser cavities, optical components, and beam propagation.** **3. Apply Laser Technologies: Apply knowledge of lasers to real-world applications in medicine, communications, and industry.** **4. Experiment with Laser Setups: Conduct experiments to measure laser properties like wavelength, power, and coherence.** **5. Evaluate Advances in Laser Technology: Critically evaluate modern laser**

	technologies and emerging trends in laser research and development.

9. Teaching and Learning Strategies

Strategy	To teach Laser Physics, use hands-on experiments like optical alignment, problem-based learning for real-world laser issues, and simulations to visualize laser processes. Employ flipped classrooms for deeper in-class discussions and group projects for collaborative learning. Leverage diagrams, animations, and virtual labs for conceptual clarity, and assess through project-based work and student presentations for practical application.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1.	9	Laser physics and Principle of laser work	Laser physics and Principle of laser worl		
2.	9	The law of conservation of energy	Energy can never be created or destroyed		
3.	9	Bohr model of the atom	Energy Levels of the atoms		
4.	9	Understand the Rate of Stimulated Emission and Absorption	Absorption, Spontaneous emission Stimulated emission		
5.	9	Boltzmann distributions and thermal equilibrium	thermal equilibrium, Norma Population		
6.	9	Population inversion	Three Level Laser , Four Level Laser		
7.	9	Laser Generation	Requirements for Laser Action		
8.	9	Pumping Plan and Methods	Pumping Plan and Methods		
9.	9	Continuous wave and pulse operation	Pulsed and continuous laser output types		
10.	9	Lasers types	1. Gas Lasers A. CO_2 Laser: Used in cutting, engraving, and		

			medical applications like dermatology. B. Helium-Neon (He-Ne) Laser: Commonly used in alignment, holography, and scientific research. C. Argon Ion Laser: Used in medical treatments, such as ey surgery, and in scientific research. D. Nitrogen Laser: Used in pulsed UV ligh applications like spectroscopy and laser-induced fluorescence.		
11.	9	Solid-State Lasers	A. Nd Laser: Widely used in industrial applications like welding and medical procedures. B. Ruby Laser: One of the first lasers ever created, used in dermatology and tattoo removal. C. Ti Laser: Often used in femtosecond pulse generation for spectroscopy and imaging. D. Er Laser: Primarily used in dentistry and dermatology for precise cutting and ablation.		
12.	9	Semiconductor (Diode) Lasers	A. Red Diode Laser: Commonly found in laser pointers and barcode scanners. B. Infrared Diode Laser: Used in optical communication and night vision systems. C. Blue Diode Laser: Employed in Blu-ray		

			players and high-definition optical storage. D. Green Diode Laser: Often used in visual displays, laser light shows and scientific applications		
13.	9	Fiber Lasers	A. Erbium-Doped Fiber Laser (EDFA): Used in optical communications for signal amplification. B. Ytterbium-Doped Fiber Laser: Popular for material processing, welding, and cutting. C. Thulium-Doped Fiber Laser: Used in medical applications, such as tissue ablation and laser surgery. D. Raman Fiber Laser: Use for high-power laser system and spectroscopy.		
14.	9	Dye Lasers	A. Rhodamine 6G Dye Laser: Used in fluorescence and spectroscopy due to its tunable range. B. Coumarin Dye Laser: Tunable into the UV range, often used in biological and chemical research. C. Fluorescein Dye Laser: Applied in ophthalmology for laser treatments like retinal photocoagulation. D. Pyrromethene Dye Laser: Used in pulsed applications and high-energy experiments.		
15.	9	Excimer Lasers .	A. Argon Fluoride (ArF) Laser: Used in LASIK eye surgery and lithography for semiconductor manufacturing. B. Krypton Fluoride (KrF) Laser: Common in UV lithography for microelectronics and eye surgeries. C. Xenon Chloride (XeCl) Laser: Applied in		

			dermatology and ndustrial surface reatments. D. Xenon Fluoride (XeF) Laser: Utilized in researcl applications for UV light production and spectroscopy		

11. Course Evaluation

Course evaluation for a Laser Physics course typically includes a combination of assessments designed to gauge both theoretical understanding and practical skills. Students may be evaluated through written exams covering core laser concepts, quizzes on specific topics, and problem-solving assignments. Hands-on lab work plays a crucial role, where students are assessed based on their ability to conduct experiments, analyze data, and properly handle laser equipment. Additionally, project-based assessments and presentations allow students to demonstrate their understanding of laser applications in real-world scenarios. Participation in group projects and discussions also contributes to evaluating teamwork and communication skills.

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	
Main references (sources)	1.Laser Fundamentals" by William T. Silfvast (2nd Edition, 2004) 2." Lasers" by Anthony E. Siegman (1986)
Recommended books and references (scientific journals, reports…)	"Laser Fundamentals" by William T. Silfvast (2nd Edit 2004)
Electronic References, Websites	

كادر المختبر

1.زينه كميل

2.زينب حازم

3.زهراء سلمان

Module Aims, Learning Outcomes and Indicative Contents الإرشادية والمحتويات التعلم ونتائج الدراسية المادة أهداف	
Module Aims **المادة أهداف الدراسية**	1- Introducing students to the general basic concept of Medical Physics. 2- Understanding Mechanics of the Body. 3- Focusing on the theoretical aspects of the discussed subject material, with some examples added for clarification. 4- Introducing the student to the medical effects of the forces acting on the body.
Module Learning Outcomes **التعلم مخرجات الدراسية للمادة**	1- Students can understand the general concept of Medical Physics. 2- Students will understand the Mechanics of the Body. 3- Allow students to know about Fundamental Forces. 4- Learn about the Medical effects of gravitation forces. 5- Students can understand the Static Equilibrium, Stability and Elasticity of the body. 6- The ability to know about the Pressure System of the Body.
Indicative Contents **المحتويات الإرشادية**	Indicative content includes the following. 1- Introduction to Medical Physics. 2- The Fundamental Physical Constants. 3- The Mechanics of the Body. 4- Medical effects of gravitation forces. 5- Stability & Elasticity. 6- Friction.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1- Discussing the topics of the curriculum book and supporting references 2- Theoretical lectures including problem solving and discussion of homework 3- Asking students, a set of thinking questions during the lectures for specific topics. 4-Giving students homework that requires finding self-solutions. 5-Giving students topics related to the curriculum to prepare a seminar.

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction To Medical Physics
Week 2	The Mechanics of the Body
Week 3	The Energy Household of the Body
Week 4	The Pressure System of the Body
Week 5	The Electrical System of the Body
Week 6	Fundamental Forces
Week 7	Medical effects of gravitation forces
Week 8	Static Equilibrium
Week 9	Stability
Week 10	Elasticity
Week 11	Friction
Week 12	Static friction
Week 13	The Pressure System Of The Body
Week 14	Final exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**

Required Texts	Medical Physics by Hasan Maridi , 3rd edition, 2020 Medical Physics Notes, 2023 https://www.tutorialsduniya.com/notes/medical-physics-notes/	

Course Description Form

1. Course Name:
First
2. Course Code:
3. Semester / Year:
2024–2025
4. Description Preparation Date:
5. Available Attendance Forms:
6. Number of Credit Hours (Total) / Number of Units (Total)
45
7. Course administrator's name (mention all, if more than one name)
Name: Assis. Prof. Dr. Jazeel Hussein Azeez Email: Jazeel.azeez@nahrainuniv.edu.iq
8. Course Objectives

Course Objectives	• **Identifying the concept of nanotechnology and the historical development of Nano science and technology, forming the energy gap, and estimating energy levels.** • **The most important methods used to measure nanomaterial** • **Formation and characterization of nano layers, nano applications,** • **Synthesis and fabrication of nanoparticles, characterization and application of nanoparticles,** • **Top–down nanostructure techniques, Nano devices and applications.** • **The most important nanomaterials and how to prepare them**

9. Teaching and Learning Strategies	
Strategy	Lectures taught in person in halls as well as electronic lectures

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2		Identifying the concept of nanotechnology and the historical development of Nano science and technology, forming the energy gap, and estimating energy levels.	In presence method	Participation
2	2		The most important methods used to measure nanomaterial	In presence method	Daily Quiz & participation
3	2		Formation and characterization of nano layers, nano applications,	In presence method	Daily Quiz & participation
4	2		Mid Examination	In presence method	
5	2		Top-down synthesis and fabrication of nanoparticles, characterization and application of nanoparticles, nanostructure techniques, nanodevices and applications.	In presence method	Daily Quiz & participation
6	2		The most important nanomaterials and how to prepare them	In presence method	Daily Quiz & participation
7	2		Getting to know the concept of nanotechnology and the historical development of nanoscience and technology, forming the energy gap, and estimating energy levels.	In presence method	Daily Quiz & participation
8	2		Examination	In presence method	
9	Final examination				

11. Course Evaluation
1.Daily exams 10% 2.Homework assignments 10% 3.mid exam 10% 4. Try exam 10% 5. (1.+2.+3.+4.)Quarterly quest 40% 6. Final exam 60%

12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	1.Nanotechnology and Nanoelectronics Materials, Devices, Measurement Technique
Main references (sources)	2.Fundamentals of Nanotechnology
Recommended books and references (scientific journals, reports…)	3.Nanostructures and Nanomaterial's synthesis, properties and application
Electronic References, Websites	4. New trends in Nanotechnology and Nanoelectronics Materials, Devices, Measurement Technique

First Course- Nuclear physics -

Course description

This course explores elements of nuclear physics for physics students. It covers basic properties of the nucleus, a nuclear force, binding energy and nuclear stability, nuclear models "two types of models are emphasized: The liquid drop model and the shell model". It also covers, radioactive decays and nuclear radioactivity. The lecture course will be integrated with problem solving classes.

أ. Pro. Dr. Kareem Khalaf Mohammad (theoretical)

ب. Essam. mohamed Rasheed (practical)

ت. Saja hazem(practical)

ث. Suhaeeb abd allha(practical)

1. Educational Institution	University Al-Nahrain- College Science
2. University Department / Center	Department Physics
3. Course name/code	Nuclear Physics
4. Programs in which it enters	-
5. Forms of attendance available	mandatory attendance
6. Semester/year	Quarterly
7. Number of hours of study ((total	hours per week total 60 hours 3
8. Date this description was prepared	2024-2025
9. Course objectives	

The main objectives of this course is hopefully to be achieved in the following steps:

- An overview of the history of the physics of the nucleus.
- A review of elements of quantum mechanics necessary to understand nuclear physics.
- Introduction of the liquid drop model and shell model
- Applications to the study of natural radioactivity and nuclear reactions.

10. Learning outcomes and methods of teaching, learning and assessment
أ- knowledge and understanding To provide students with an opportunity to develop knowledge and understanding of the key principles and applications of Nuclear Physics, and their relevance to current developments in physics.
ب - Subject-specific skills
Teaching and learning methods
- Theoretical lectures - Asking students a set of thinking questions during the lectures for specific topics. - Giving students homework that requires finding self-solutions.
Evaluation methods
- daily tests - Monthly exams - Homework and student interaction in discussion sessions
Thinking skills: Scientific problem solving skills- Giving students problems that need to be solved by referring to external references that can be found via the Internet
- General and transferable skills (other skills related to employability and personal development). - Follow up on the scientific development of curricula for international universities via the Internet

Course Structure .11

Evaluation method	education method	Unit/course or topic name	Required learning outcomes	Hours	Week
Oral and written exam	theoretical) (	Background and basic nuclear properties	Historical review and general introduction The atomic mass unit Energy unit Basic nuclear properties	4	1
Oral and written exam	theoretical) (	Basic nuclear properties	The size of the nucleus, Nuclear energy level, Intrinsic angular momentum of the nucleus, Nuclear electromagnetic moment, Electric Quadra pole moment, Parity	4	2
Oral and written exam	theoretical) (	Yukawa's mesons field theory, Nuclear binding energy, average binding energy	Yukawa's mesons field theory, Nuclear binding energy	4	3
Oral and written exam	theoretical) (	Nuclear forces, Separation energy of nuclear particle	Nuclear forces, Separation energy of nuclear particle (alpha neutron, proton), Abundance systematic of the stable nuclides	4	4
Oral and written exam	theoretical) (	Nuclear models	Nuclear models, Electron proton hypothesis, Prout hypothesis	4	5
Oral and written exam	theoretical) (	Liquid drop model, mass parabola	Liquid drop model, Mass parabola	4	6
		Mid Exam-1	Mid Exam		7
Oral and written exam	theoretical) (	Shell model	Shell model , potential, Finite and infinite square potential, harmonic potential	4	8
Oral and written exam	theoretical) (	Shell model and optical model	Spin orbit potential, Predictions of shell model, Optical model	4	9
Oral and written exam	theoretical) (	Interaction of radiation with matter	Interaction of radiation with the matter, Statistical nature of radiation	4	10
Oral and written exam	theoretical) (	Interaction of radiation with matter	Heavy charge particles, Light charge particles,	4	11
Oral and written exam	(theoretical	Interaction of radiation with matter	Neutrons, Electromagnetic radiation,	4	12
Oral and written exam	theoretical) (	Exposure and dose	Exposure and dose principles,	4	13
Oral and written exam	theoretical) (	Shielding	Shielding principles	4	14
		Mid Exam-2	Mid Exam-2	4	15

Infrastructure	
➢ Text Book: • Walter E. Meyerhof: elements of nuclear physics • Kenneth S. Krane: Introductory nuclear physics • Henry Semat and John R. Albright: Introduction to atomic and nuclear physics • Beiser: Concept of modern physics • Irving Kaplan: Nuclear physics • Cohen: Concepts of Nuclear Physics • Kupta: Concepts of Modern Physics	:Required readings Basic Texts Course Books Other ▪
/	Special requirements (including, for example, workshops, courses, software (and websites
NON	Social services (including guest lectures, professional training (and field studies

Acceptance .12	
NON	Prerequisites
10	Less number of students
40	More number of students

On successful completion of the course students will be able to:

1. Have acquire knowledge and understanding about the electronic and nuclear structure of atoms.

2. Have solved problems related to the structure of atoms and the effect of ionizing radiation on the body and the environment.

3. Have an appreciation of the influence of atomic and nuclear physics on modern scientific development.

4. Have the foundations for examining in more detail various aspects of experimental and theoretical physics which relate to both atomic and nuclear physics.

5. Be able to explain the key areas in which Atomic and Nuclear Physics affects everyday living.