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
Final Certificate Name: B.Sc
Academic System: Semester
Description Preparation Date: 2023 - 2024
File Completion Date: 2024

Signature:
Head of Department Name: Suha Mousa Khorsheed
Date: 14/4/2024

Signature:
Scientific Associate Name: Manaf Aduan Saleh
Date: 14/4/2024

The file is checked by: Dr. Orooba Nadhim Harbi
Department of Quality Assurance and University Performance
Director of the Quality Assurance and University Performance Department:
Date: 14/4/2024
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	Mechanics and properties of materials I	PHY	الاولى
2	2	Electricity	PHY	الاولى
	2	General astronomy	PHY	الاولى
	2	Mathematics I	PHY	الاولى
	2	Human rights &democracy	PHY	الاولى
	2	Computers I	PHY	الاولى
2	2	Mechanics and properties of materials II	PHY	الاولى
	2	Magnetism	PHY	الاولى
	2	Mathematics II	PHY	الاولى
	2	English Language	PHY	الاولى
	2	General Chemistry	PHY	الاولى
2	2	Computers II	PHY	الاولى
	2	Arabic language	PHY	الاولى
2	2	Analog electronics	PHY	الثانية
2	2	Thermodynamics	PHY	الثانية
	2	Mathematics ODE	PHY	الثانية
2	2	Analytic mechanics I	PHY	الثانية
2	2	Computers Lab.	PHY	الثانية
	2	Modern physics I	PHY	الثانية
	2	جرائم حزب البعث	PHY	الثانية
2	2	Sound & wave motion	PHY	الثانية
2	2	digital electronics	PHY	الثانية
2	2	Thermodynamics and statistical	PHY	الثانية
	2	Modern physics II	PHY	الثانية
2		Computers Lab.	PHY	الثانية
	2	Analytic mechanics I	PHY	الثانية

	2	Mathematics PDE	PHY	الثانية
2	**2**	Complex analysis	PHY	الثانية
2	**2**	Atomic physics	PHY	الثالثة
	2	Plasma physics	PHY	الثالثة
	2	Quantum mechanics I	PHY	الثالثة
	2	Methodology	PHY	الثالثة
	2	Electromagnetic theory I	PHY	الثالثة
	2	Medical physics I	PHY	الثالثة
2	**2**	Electronics I	PHY	الثالثة
	2	Molecular physics	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	Medical physics II	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
	2	Advance classical mechanics	MSc.	ماجستير
	2	Advance Solid state physics I	MSc.	ماجستير
	2	Mathematical physics	MSc.	ماجستير
	2	Statistical physics	MSc.	ماجستير
	2	English Language I	MSc.	ماجستير
	2	Advanced Nuclear physics	MSc.	ماجستير
	2	Advanced Quantum mechanics	MSc.	ماجستير
	2	Electromagnetic theory	MSc.	ماجستير
	2	Physics of ionized gases	MSc.	ماجستير
	2	Liquid crystal	MSc.	ماجستير
	2	Scientific Methodology	MSc.	ماجستير
	2	English Language II	MSc.	ماجستير
	2	Relativistic Quantum theory	Ph.D	دكتوراه
	2	Classical electrodynamics	Ph.D	دكتوراه

	2	English Language	Ph.D	دكتوراه
	2	Nanophotonic	Ph.D	دكتوراه
	2	Charge d particles optics	Ph.D	دكتوراه
	2	Advanced Plasma physics	Ph.D	دكتوراه
	2	Scientific Methodology	Ph.D	دكتوراه
	2	Advanced Statistical physics	Ph.D	دكتوراه
	2	Advance Solid state physics II	Ph.D	دكتوراه
	2	English Language	Ph.D	دكتوراه
	2	Aberration theory	Ph.D	دكتوراه
	2	Quantum optics	Ph.D	دكتوراه
	2	Radiological physics	Ph.D	دكتوراه
	2	Medical physics	Ph.D	دكتوراه

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

أ.م.د.جزيل حسين	استاذ مساعد دكتور	علوم الفيزياء	فلك			1	
أ.م.د.حسن ناصر	استاذ مساعد دكتور	علوم الفيزياء	بلازما			1	
أ.م.د.وسن علي موسى	استاذ مساعد دكتور	علوم الفيزياء	صلبة			1	
أ.م.د.مروة عبد المحسن	استاذ مساعد دكتور	علوم الفيزياء	اشعاعية			1	
أ.م.د ابراهيم عبدالمهدي	استاذ مساعد دكتور	علوم الفيزياء	احصائية			1	
ا.م.د.نيسان سعود	استاذ مساعد دكتور	علوم الفيزياء	بلازما			1	
ا.م.د سديم عباس	استاذ مساعد دكتور	علوم الفيزياء	صلبة			1	
م.د.احمد شاكر	مدرس دكتور	علوم الفيزياء	نظرية			1	
أ.م.نور محمد حسن	استاذ مساعد	علوم الفيزياء	بصريات			1	
م.د.عمر اياد	مدرس دكتور	علوم الفيزياء	نظرية			1	
م.د.سلام اسماعيل	مدرس دكتور	علوم الفيزياء	فلك			1	
أ.م.د.زينب منذر	استاذ مساعد دكتور	علوم الفيزياء	الكترونيك			1	
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	
م.د بلال خالد	مدرس دكتور	علوم الفيزياء	نظرية			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	Mechanics and properties of materials I	PHY	مرحلة اولى	بكالوريوس
								✓	✓	✓	✓	اساسى	Electricity	PHY	مرحلة اولى	
								✓	✓	✓	✓	اساسى	General astronomy	PHY	مرحلة اولى	
								✓	✓	✓	✓	اختياري	Mathematics I	PHY	مرحلة اولى	
								✓	✓	✓	✓	اختياري	Human rights &democracy	PHY	مرحلة اولى	
								✓	✓	✓	✓		Computers I	PHY	مرحلة اولى	
								✓	✓	✓	✓	اساسى	Mechanics and properties of materials II	PHY	مرحلة اولى	
								✓	✓	✓	✓	اساسى	Magnetism	PHY	مرحلة اولى	
								✓	✓	✓	✓	اختياري	Mathematics II	PHY	مرحلة اولى	
								✓	✓	✓	✓	اختياري	English Language	PHY	مرحلة اولى	

								✓	✓	✓	✓	اختياري	General Chemistry	PHY	مرحلة اولى	
								✓	✓	✓	✓	اساسى	Computers II	PHY	مرحلة اولى	
								✓	✓	✓	✓	اختياري	Arabic language	PHY	مرحلة اولى	
								✓	✓	✓	✓	اساسى	Analog electronics	PHY	مرحلة ثانية	بكالوريوس
								✓	✓	✓	✓	اساسى	Thermodynamics	PHY	مرحلة ثانية	
								✓	✓	✓	✓	اساسى	Mathematics ODE	PHY	مرحلة ثانية	
								✓	✓	✓	✓	اساسى	Analytic mechanics I	PHY	مرحلة ثانية	
								✓	✓	✓	✓	اساسى	Computers Lab.	PHY	مرحلة ثانية	
								✓	✓	✓	✓	اساسى	Modern physics I	PHY	مرحلة ثانية	
								✓	✓	✓	✓	اختياري	جرائم حزب البعث	PHY	مرحلة ثانية	
								✓	✓	✓	✓	اساسى	Sound & wave motion	PHY	مرحلة ثانية	
								✓	✓	✓	✓	اساسى	digital electronics	PHY	مرحلة ثانية	
								✓	✓	✓	✓	اساسى	Thermodynamics and statistical	PHY	مرحلة ثانية	
								✓	✓	✓	✓	اساسى	Modern physics II	PHY	مرحلة ثانية	

								✓	✓	✓	✓	اساسى	Computers Lab.	PHY	مرحلة ثانية	
								✓	✓	✓	✓	اساسى	Analytic mechanics I	PHY	مرحلة ثانية	
								✓	✓	✓	✓	اساسى	Mathematics PDE	PHY	مرحلة ثانية	
								✓	✓	✓	✓	اساسى	Complex analysis	PHY	مرحلة ثانية	
								✓	✓	✓	✓					
								✓	✓	✓	✓	اساسى	Atomic physics	PHY	مرحلة ثالثة	
								✓	✓	✓	✓	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	
								✓	✓	✓	✓	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	

								✓	✓	✓	✓	اساسی	Nuclear physics II	PHY	مرحلة رابعة	
								✓	✓	✓	✓	اساسی	Advanced Medical physics	PHY	مرحلة رابعة	
								✓	✓	✓	✓	اساسی	Solar physics	PHY	مرحلة رابعة	
			✓	✓			✓	✓	✓	✓	✓	اساسی	Advance classical mechanics	MSc	ماجستير	
			✓	✓			✓	✓	✓	✓	✓	اساسی	Advance Solid state physics I			
			✓	✓			✓	✓	✓	✓	✓	اساسی	Mathematical physics			
			✓	✓			✓	✓	✓	✓	✓	اساسی	Statistical physics			
			✓	✓			✓	✓	✓	✓	✓	اختياري	English Language I			
			✓	✓			✓	✓	✓	✓	✓	اساسی	Advanced Nuclear physics			
			✓	✓			✓	✓	✓	✓	✓	اساسی	Advanced Quantum mechanics			
			✓	✓			✓	✓	✓	✓	✓	اساسی	Electromagnetic			

												theory		
		✓	✓		✓	✓	✓	✓	✓	✓	✓	اساسی Physics of ionized gases		
		✓	✓		✓	✓	✓	✓	✓	✓	✓	اساسی Liquid crystal		
		✓	✓		✓	✓	✓	✓	✓	✓	✓	اختياري Scientific Methodology		
		✓	✓		✓	✓	✓	✓	✓	✓	✓	اختياري English Language II		
		✓	✓		✓	✓	✓	✓	✓	✓	✓	اساسی Relativistic Quantum theory	**Ph.D**	**دکتوراه**
		✓	✓		✓	✓	✓	✓	✓	✓	✓	اساسی Classical electrodynamics		
		✓	✓		✓	✓	✓	✓	✓	✓	✓	اختياري English Language		
		✓	✓		✓	✓	✓	✓	✓	✓	✓	اساسی Nanophotonic		
		✓	✓		✓	✓	✓	✓	✓	✓	✓	اساسی Charge d particles optics		
		✓	✓		✓	✓	✓	✓	✓	✓	✓	اساسی Advanced Plasma physics		
		✓	✓		✓	✓	✓	✓	✓	✓	✓	اساسی Scientific Methodology		
		✓	✓		✓	✓	✓	✓	✓	✓	✓	اساسی Advanced Statistical		

												physics			
		✓	✓		✓	✓	✓	✓	✓	✓	✓	اساسى	Advance Solid state physics II		
		✓	✓		✓	✓	✓	✓	✓	✓	✓	اختياري	English Language		
		✓	✓		✓	✓	✓	✓	✓	✓	✓	اساسى	Aberration theory		
		✓	✓		✓	✓	✓	✓	✓	✓	✓	اساسى	Quantum optics		
		✓	✓		✓	✓	✓	✓	✓	✓	✓	اساسى	Radiological physics		
		✓	✓		✓	✓	✓	✓	✓	✓	✓	اساسى	Medical physics		

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

Course Description Form

1. Course Name:	**Thermodynamics**
2. Course Code:	
3. Semester / Year:	1st semester/ 2nd year physics
4. Description Preparation Date:	17/3/2024
5. Available Attendance Forms:	Immanence
6. Number of Credit Hours (Total) / Number of Units (Total)	
30 hours theory+45 hours practically / 3 UNITS	
7. Course administrator's name (mention all, if more than one name)	
Name: Assist. Prof. Dr. Hassan N. Hashim Email: hassan.hashim@nahrainuniv.edu.iq Ghufran Mohammed Jassam Email: ghufran.muhammed@nahrainuniv.edu.iq Hala fadhel Email: hala.fadhel@nahrainuniv.edu.iq Fatima muqdad Email: fatima.muqdad@nahrainuniv.edu.iq Rewasiayad Email: rewasi.ayad@nahrainuniv.edu.iq Reeham.ali Email: reeham.ali@nahrainuniv.edu.iq Mays.ata Email: mays.ata@nahrainuniv.edu.iq	
8. Course Objectives	
Course Objectives	This course is deal and present a basic idea for thermodynamic science and the co-relation between the work and heat according to the first and second laws of thermodynamics ,also according to these mentioned laws, one can find the several property of macroscopic view of matter which is consider as a principle of many industrial applications such internal and external combustion engines, cooling engines and power stations. This course depend on differentiation and integration equations in order to explain many relationships between effective parameters such thermodynamic coordinates.
9. Teaching and Learning Strategies	
Strategy	- Discuss the subjects as in the textbook and the references. - the theoretical lectures include solutions for the problems and discussion for the home works. - Asking the students some tricking questions through the lectures for

	specific subjects. - Giving the students homework's that need a unique solutions.

10. Course Structure

Week	Hours	Unit or subject name	Learning method	Evaluation method
1	2	**Important definitions**	Theoretical	
2	2	**Reversible and irreversible processes**	Theoretical	Quizes
3	2	**Ideal gas**	Theoretical	Quizes
4	2	**Heat transfer**	Theoretical	Quizes
5	2	**First law of thermodynamics**	Theoretical	Quizes
6	2	**Equation of state**	Theoretical	Quizes
7	2	**Adiabatic processes**	Theoretical	Quizes
8	2	**Bulk modulus**	Theoretical	Quizes
9	2	**Specific heat capacity of constant volume**	Theoretical	Quizes
10	2	**Specific heat capacity of constant pressure**	Theoretical	Quizes
11	2	**Work and heat**	Theoretical	Quizes
12	2	**Second law of thermodynamic**	Theoretical	Quizes
13	2	**Carnot machine, thermal and refrigerator machines**	Theoretical	Quizes
14	2	**Maxwell's equations**	Theoretical	Quizes
15	3	Final Exam	Theoretical	Written exam

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)	**Thermodynamics, The Kinetic Theory of Gases, and Statistical Mechanics** **By Francis Weston Sears**
Main references (sources)	الحرارة والثرموداينمك تأليف: د. سعيد خضر و آمنه احمد رمزي – جامعة بغداد **Heat and Thermodynamics,** **Mark W. Zemansky,** **McGraw Hill, 1968**
Recommended books and references (scientific journals, reports…)	Any reference include thermodynamics principles .
Electronic References, Websites	Any website that deals with thermodynamics Principles.

كادر مختبر الثرموداينامك :

1. م.م. هالة فاضل عباس / مسؤول المختبر

2. م.م.فاطمة مقداد أحمد
3. م.م. ميس عطا الله وحش
4. م.م. رواسي أياد محمد

Course Description Form

1. Course Name: Analytical Mechanics I

2. Course Code:

3. Semester / Year: First /2023-2024

4. Description Preparation Date: 1/9/2023

5. Available Attendance Forms: Obligatory

6. Number of Credit Hours (Total) / Number of Units (Total): 30 hr. / 2 units

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

Name: Dr. Ahmed Shakir Mahmood Yas
Email: Ahmad.Mohmood@nahrainuniv.edu.iq

8. Course Objectives

Course Objectives	• Teach the student the bases of Analytical Mechanics. • Teach the student solve the problems that includes calculus, vectors and other varieties of topics in physics. • Teach the student solve some of the physical and geometrical problems that include ordinary differential equations with space and Time constraints.

9. Teaching and Learning Strategies

Strategy	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2		Introduction to vectors	Theoretical	monthly written exams and home works.

2	2		Introduction to vectors	Theoretical	monthly written exams and homework.
3	2		Scalar and vector products, triple products and vector calculus	Theoretical	monthly written exams and homework.
4	2		Tangential and normal components of acceleration vector	Theoretical	monthly written exams and homework.
5	2		Position, velocity and acceleration vector in rectangular and plane polar coordinates	Theoretical	monthly written exams and homework.
6	2		Position, velocity and acceleration vector in cylindrical and spherical coordinates.	Theoretical	monthly written exams and homework.
7	2		Problems and solutions.	Theoretical	monthly written exams and homework.
8	2		First mid exam	Theoretical	written exam
9	2		Newton’s laws of motion, rectilinear motion under a constant force.	Theoretical	monthly written exams and homework.
10	2		Forces that depend on position and the concepts of kinetic and potential energy.	Theoretical	monthly written exams and homework.
11	2		Problems and solutions.	Theoretical	monthly written exams and homework.
12	2		Forces that depend on velocity, fluid resistance, the terminal velocity and solve some problems.	Theoretical	monthly written exams and homework.
13	2		Problems and solutions.	Theoretical	monthly written exams and homework.
14	2		Problems and solutions.	Theoretical	monthly written exams and homework.
15	2		Second mid exam	Theoretical	written exam

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)	"Analytical Mechanics" by Fowles & Cassidy, Edition, (Thomson Brooks/Cole),2005.
Main references (sources)	-
Recommended books and references (scientific journals, reports…)	- "Analytical Mechanics Solutions to Problems in Classical Physics" by Ioan Merches, Daniel Radu · 2014
Electronic References, Websites	- MIT- Open Course YouTube https://www.youtube.com/channel/UCEBb1b_L6zDS3xTUrIALZOw - MIT- Open Course https://ocw.mit.edu/

Course Description Form

1. Course Name:

Modern Physics I

2. Course Code:

3. Semester / Year:

1st / 2023−2024

4. Description Preparation Date:

2023

5. Available Attendance Forms:

Attendance

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

30 hours

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

Name: Noor M. Yaseen
Email: noor.mohammed@nahrainuniv.edu

8. Course Objectives

Course Objectives	All Goals mentioned in the aims of the course • Historic Origins of Modern Physics • Most prominent Scientific Experiments and topics related modern physics • The atomic nature of matter • The atomic nature of electricity • The atomic nature of electromagnetic radiation • The Matter Waves

9. Teaching and Learning Strategies

Strategy	To provide students the knowledge about the origins of Modern Physics and To enable the students to realize the meaning of the concepts and their applications To provide the students with the necessary skills to solve the problems concerning Modern Physics and applications To qualify the students to study advanced programs, materials and topics in physics that concerns modern physics

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Required knowledge and skills	Electromagnetic Radiation and Its Spectrum	Classroom Lecture	Oral Questions Home assessments Written exams

2	2	Required knowledge and skills	Black-Body Radiation	Classroom Lecture	Oral Questions Home assessments Written exams
3	2	Required knowledge and skills	Laws of Stephan-Boltzmann, Rayliegh- Jean and Wein Displacement	Classroom Lecture	Oral Questions Home assessments Written exams
4	2	Required knowledge and skills	Wave Particle Dualit of Light and Photoelectric Effect	Classroom Lectur	Oral Questions Home assessments Written exams
5	2	Required knowledge and skills	Photoelectric Effect	Classroom Lectur	Oral Questions Home assessments Written exams
6	2	Required knowledge and skills	X-rays	Classroom Lectur	Oral Questions Home assessments Written exams
7	2	Required knowledge and skills	X-rays	Classroom Lectur	Oral Questions Home assessments Written exams
8	2	Required knowledge and skills	X-rays	Classroom Lectur	Oral Questions Home assessments Written exams
9	2	Required knowledge and skills	Compton Effect	Classroom Lectur	Oral Questions Home assessments Written exams
10	2	Required knowledge	Gamma rays and Pai Production	Classroom Lectur	Oral Questions

		and skills			Home assessments Written exams
11	2	Required knowledge and skills	Cosmic Rays and	Classroom Lectur	Oral Questions Home assessments Written exams
12	2	Required knowledge and skills	Radiation Momentun and Radiation Pressu	Classroom Lectur	Oral Questions Home assessments Written exams
13	2	Required knowledge and skills	De Broglie Hypothes and Matter waves	Classroom Lectur	Oral Questions Home assessments Written exams
14	2	Required knowledge and skills	Wave particle Dualit	Classroom Lectur	Oral Questions Home assessments Written exams
15	2	Required knowledge and skills	Course Review	Classroom Lectur	

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	• Modern Physics by Keneth Krane • Physics of the atom by Weher, Richards and Adair • Introduction of atomic and nuclear Physics by Sem
Main references (sources)	Modern Physics by Arthur Beiser
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

Course Description Form

1. Course Name: Analog Electronic

2. Course Code:

3. Semester / Year: first 2023/2024

4. Description Preparation Date: 17/3/2024

5. Available Attendance Forms: mandatory attendance

6. Number of Credit Hours (Total) / Number of Units (Total)5

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

Name: Dr. Zainab M. Kubba
Email: zainab.kubba@nahrainuniv.edu.iq
Ragad saad,,

8. Course Objectives

Course Objectives	To study electronics and immediately starts training in this specialty, thus providing motivation

9. Teaching and Learning Strategies

Strategy	Lectures Lab Sessions Tutorial

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Topic Overview	Semiconductor Diode & Material Characteristics	Theoretical and practical	Oral and written exam
2	2		Operation of Bipolar Transistor	Theoretical and practical	Oral and written exam
3	2		Common Emitter configuration	Theoretical and practical	Oral and written exam
4	2		Voltage Divider Biase	Theoretical and practical	Oral and written exam
5	2		Dc operating point , AC equivalent circuit	Theoretical and practical	Oral and written exam
6	2		Common Emitter Amplifier& Frequency Response	Theoretical and practical	Oral and written exam
7	2		Exam	Theoretical and practical	Oral and written exam
8	2		JFET	Theoretical and practical	Oral and written exam
9	2		MOSFET	Theoretical and practical	Oral and written exam
10	2		Differential Amplifier	Theoretical and practical	Oral and written exam
11	2		Exam	Theoretical and practical	Oral and written exam
12	2		Op. Amp. Characteristics	Theoretical and practical	Oral and written exam
13	2		op. Comparator	Theoretical and practical	Oral and written exam
14	2		Op. Amp.Adder Op. Amp. Integrator	Theoretical and practical	Oral and written exam
15	2		Op. Amp. Differentiator	Theoretical and practical	Oral and written exam

11. Course Evaluation

Course Assessment	Term Tests	Laboratory	Quizzes	Assignments	Final Exam
	(20%)	)%25(	(5%)	(50%)	(50%)

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	

Main references (sources)	Electronic Devices, Thomas L. Floyd, 7th edition, Pearson Education international, 2005. • Electronic Devices, Tocci, 3rd edition, Charles E. Merrill Publishing Company, 1983.

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

Course Description Form

1. Course Name:
Programming with MATLAB I
2. Course Code:
PHYS2104
3. Semester / Year:
First Semester / 2023-2024
4. Description Preparation Date:
18 / 3 / 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: Dr. Omar Ayad Jalal Email: omar.jalal@nahrainuniv.edu.iq Suhaib Qusay Abdullah Email: suhaib.qusay@nahrainuniv.edu.iq Rewasi Ayad Mohamed Email: rewasi.ayad@nahrainuniv.edu.iq Ahmed Kadhim Uaid Email: ahme.kadhim@nahrainuniv.edu.iq Sara Mustafa Ibrahim Email: sara.mustafa@nahrainuniv.edu.iq
8. Course Objectives

Course Objectives	• **Teaching students the basics of the MATLAB language.** • **Teaching students to write advanced MATLAB programs.** • **Teaching the student to solve some physics problems using the MATLAB language.**
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	Introduction	Introduction	Experimental	Oral and written exam
2	2	MATLAB work space	MATLAB work space	Experimental	Oral and written exam
3	2	Simple Mathematics	Simple Mathematics	Experimental	Oral and written exam
4	2	About Variables	About Variables	Experimental	Oral and written exam
5	2	Comment and Punctuation	Comment and Punctuation	Experimental	Oral and written exam
6	2	Complex Numbers	Complex Numbers	Experimental	Oral and written exam
7	2	Common Mathematical function	Common Mathematical function	Experimental	Oral and written exam
8	2	Simple Array	Simple Array	Experimental	Oral and written exam
9	2	Array Construction	Array Construction	Experimental	Oral and written exam
10	2	Array Addressing	Array Addressing	Experimental	Oral and written exam
11	2	Array Manipulation	Array Manipulation	Experimental	Oral and written exam
12	2	Sets of Linear Equations	Sets of Linear Equations	Experimental	Oral and written exam
13	2	Relational Operators	Relational Operators	Experimental	Oral and written exam
14	2	Logical Operators	Logical Operators	Experimental	Oral and written exam
15	2	Exam	Exam	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:
ODE
2. Course Code:
3. Semester / Year:
First / Second
4. Description Preparation Date:
2024
5. Available Attendance Forms:
Physical attendance
6. Number of Credit Hours (Total) / Number of Units (Total)
45 Hours/ 3 Units
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Fatimah Al-Taie Email: fatimah.altaie@nahrainuniv.edu.iq
8. Course Objectives

Course Objectives	• Learning the basic concepts of mathematics, application in reality, solution of ordinary differential equations with first-, and higher-order and their applications. In addition, different classes of ODEs are considered.

9. Teaching and Learning Strategies

Strategy	The learning and teaching strategy is presented by: Providing the students with a sufficient amount of mathematical terms and definitions by attending lectures and presenting on the whiteboard to connect the students with the lecturer to solve as many real-life applications as possible. The pdf lectures, homework, quizzes, and exercises are shared on Google Classroom.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1-2	6	Introduction to DE'	Definition and classification of Differential Equations (DE's)	lectures	

3-6	12	First-order DE's	Methods for solving fi order ODE's	lectures	
7-9	9	Higher DE's	The general form of higher-order DE's	lectures	
10-11	6	Homogeneous DE'	Definition and metho on solving homo. DE'	lectures	
12-13	6	Nonhomogeneous DE's	Definition, properties, and methods of solvin non-homo. DE's	lectures	
14-15	6	Laplace transform	Definition/properties c Laplace transform and then using Laplace transformation in solv DE's	lectures	

11. Course Evaluation

Pre-final exam: 40%
(Quizzes, homework: 10%, Mid-Exams 30%).

Final exam: 60%

Total: 100%

12. Learning and Teaching Resources

Required textbooks (curricu books, if any)	Earl D. Rainville and Phillip E. Bedient, Elementary Differential Equations, Collier Macmillan Publishers, fifth Edition, New York, 1974.
Main references (sources)	**[1]** C. Henry Edwards and David E. Penney, Differential Equations and Linear Algebra, ser. Pearson International Edition, third edition. Pearson Education, United States of America, 2010. **[2]** William E. Boyce, and Richard C. DiPrima, Elementary Differential Equations and Boundary Value Problems, John Wiley and Sons, Inc. Seventh edition, United State of America. 2001
Recommended books and references (scientific journals, reports…)	Applications of ODE's
Electronic Referenc Websites	**1**- Google.com **2-** https://www.khanacademy.org/math/differential-equations

Course Description Form

1. Course Name:
modern physics
2. Course Code:
3. Semester / Year:
2024−2
4. Description Preparation Date:
2024
5. Available Attendance Forms:
Attending
6. Number of Credit Hours (Total) / Number of Units (Total)
(2 theoretical / 2 unit)
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Wildan Wohammed Awad Email: wildan.awad@nahrainuniv.edu.iq
8. Course Objectives

Course Objectives	• **Teaching the student the basics of modern physics**

9. Teaching and Learning Strategies

Strategy	Discuss the topics of the methodological book and auxiliary references Theoretical lectures including problem solutions and discussion of homework sk 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.	2	Wave particle duality	Wave particle duality	theoretical	oral exam
2.	2	De Broglie Hypothesis	De Broglie Hypothesis	theoretical	oral exam
3.	2	Davison-Germer experiment	Davison-Germer experiment	theoretical	oral exam

4.	2	Wave packet	Wave packet	theoretical	oral exam
5.	2	Wave localization in space	Wave localization in space	theoretical	oral exam
6.	2	Derivation of Heisenberg's uncertainty	Derivation of Heisenberg's uncertainty	theoretical	oral exam
7.	2	The relationship between uncertainty and energy and time	The relationship between uncertainty and energy and time	theoretical	oral exam
8.	2	Wave function and Schrödinger equation	Wave function and Schrödinger equation	theoretical	oral exam
9.	2	General properties of the wave function	General properties of the wave function	theoretical	oral exam
10.	2	Measurement process in quantum mechanics	Measurement process in quantum mechanics	theoretical	oral exam
11.	2	Expectation value	Expectation value	theoretical	oral exam
12.	2	Probability Density	Probability Density	theoretical	oral exam
13.	2	the theory of relativity	the theory of relativity	theoretical	oral exam
14.	2	Spatial relativity Hypothesis	Spatial relativity Hypothesis	theoretical	oral exam
15.	2	Special laws of relativity and its applications	Special laws of relativity and its applications	theoretical	oral exam

11. Course Evaluation

40/100 (25 monthly exams + 10 homework + 5 daily activity)
100/60 (final exams)

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	
Main references (sources)	Krane, Kenneth S. Modern physi John Wiley & Sons, 2019.
Recommended books and references (scientific journals, reports…)	Krane, Kenneth S. Modern physi John Wiley & Sons, 2019.
Electronic References, Websites	

Course Description Form

1. Course Name:

Sound and wave motion

2. Course Code:

3. Semester / Year:2nd 2023/2024

4. Description Preparation Date:1/2/2024

5. Available Attendance Forms:present

6. Number of Credit Hours (Total) / Number of Units (Total)5 hrs. per week/ 3theoretical +2 hrs. per week practical / total;4units per week

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

Ass. Prof. Dr. Nissan soudoribi Email:nissan.oribi@nahrainuniv.edu.iq
Ghufran Mohammed Jassam Email: ghufran.muhammed@nahrainuniv.edu.iq
Saja Qais Email: saja .qais@nahrainuniv.edu.iq
Rasha Shahir Badawi Email: rasha.shahir@nahrainuniv.edu.iq
Kawther Mohamed Jaafar Email: kothermohamed1998@gmail.com

8. Course Objectives

Course Objectives	• Understand the advanced concepts in physics of the sound and wave • Linking a theoretical concept with the application • Giving the student the opportunity to solve the equation

9. Teaching and Learning Strategies

Strategy	1- Seminar presentation by students to enhance their skills 2- help students on the scientific discussion during lectures 3- help the student in the solving the problems

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Academic	Introduction of wave ,types of waves Properties of wave	Lecture	discussion
2	3	Academic	Simple harmonic motion ,position ,velocity ,acceleration and energ	Lecture	discussion
3	3	Academic	Examples	Lecture	discussion
4	3	Academic	Superposition principle	Lecture	discussion
5	3	Academic	Superposition principle	Lecture	discussion

6	3	Academic	The damped harmonic oscillation	Lecture	discussion
7	3	Academic	Exam	Lecture	Exam
8	3	Academic	The damped harmonic oscillation	Lecture	discussion
9	3	Academic	Damping scale . examples	Lecture	discussion
10	3	Academic	Forced vibration (force oscillation)	Lecture	discussion
11	3	Academic	Resonance and its application	Lecture	discussion
12	3	Academic	Sound and its characteristics	Lecture	discussion
13	3	Academic	Sound and its characteristics	Lecture	discussion
14	3	Academic	Doppler effect ,examples	Lecture	discussion
15	3	Academic	Exam	Lecture	Exam

11.
Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, dailyoral, monthly, or written exams, reports ....etc 40% (25% theoretical +15% practical)mid exam+ discussion+ solving homework+ reports 60% final exam(50% theoretical +10% practical)

12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Vibration and wave By : W.W.Norton and company
Main references (sources)	Wave phenomena By: Akira Hirose
Recommended books and references (scientific journals, reports…)	All related international lectures and research were dependent
Electronic References, Websites	All books and global sites in the internet

Course Description Form

1. Course Name: Analytical Mechanics 2
2. Course Code:
3. Semester / Year: Second /2023-2024
4. Description Preparation Date: 1/2/2024
5. Available Attendance Forms: Obligatory
6. Number of Credit Hours (Total) / Number of Units (Total): 30 hr. / 2 units
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Ahmed Shakir Mahmood Yas Email: Ahmad.Mohmood@nahrainuniv.edu.iq
8. Course Objectives

Course Objectives	• Teach the student the bases of Analytical Mechanics. • Teach the student solve the problems that includes calculus, vectors and other varieties of topics in physics. • Teach the student solve some of the physical and geometrical problems that include ordinary differential equations with space and Time constraints.
9. Teaching and Learning Strategies	
Strategy	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes.

10. Course Structure					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
1	2		Introduction: General Principles	Theoretical	monthly written exams and homework.
2	2		Work principle and potential energy function in three-dimensional motion	Theoretical	monthly written exams and homework.
3	2		The Del operator	Theoretical	monthly written exams and homework.
4	2		Conservative Forces and Force Fields	Theoretical	monthly written exams and homework.
5	2		Problems and solutions.	Theoretical	monthly written exams and homework.
6	2		Problems and solutions.	Theoretical	monthly written exams and homework.
7	2		Motion of Charged Particle in Electric and Magnetic Field	Theoretical	monthly written exams and homework.
8	2		First mid exam	Theoretical	written exam
9	2		Lagrange's Equation of motion and Lagrange's function for conservative system	Theoretical	monthly written exams and homework.
10	2		Some Applications of Lagrange's Equations.	Theoretical	monthly written exams and homework.
11	2		Problems and solutions.	Theoretical	monthly written exams and homework.
12	2		The Hamiltonian Function and Hamilton's Equation	Theoretical	monthly written exams and homework.
13	2		Problems and solutions.	Theoretical	monthly written exams and homework.
14	2		Problems and solutions.	Theoretical	monthly written exams and homework.

15	2		Second mid exam	Theoretical	written exam

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)	"Analytical Mechanics" by Fowles & Cassidy, Edition, (Thomson Brooks/Cole),2005.
Main references (sources)	-
Recommended books and references (scientific journals, reports…)	- "Analytical Mechanics Solutions to Problems in Classical Physics" by Ioan Merches, Daniel Radu · 2014
Electronic References, Websites	- MIT- Open Course YouTube https://www.youtube.com/channel/UCEBb1b_L6zDS3xTUrIALZOw - MIT- Open Course https://ocw.mit.edu/

Course Description Form

1. Course Name: Digital Electronics
2. Course Code:
3. Semester / Year: second 2023-2024
4. Description Preparation Date: 17/3/2024
5. Available Attendance Forms:
6. Number of Credit Hours (Total) / Number of Units (Total) (2 theoretical + 2 practical)hours
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Zainab M. Kubba Email: zainab.kubba@nahrainuniv.edu.iq Esaam M. Rasheed , Narjes zamel , Reem mzahem, Reham Ali
8. Course Objectives

Course Objectives	The aim of the course is to introduce and provide basic idea about binary system, digital logic gates, arithmetic operations, the principles of combinational and sequential digital logic design.

9. Teaching and Learning Strategies

Strategy	Lectures Lab Sessions Tutorial

10- course structure

Evaluation method	Learning method	Unit or subject name	Required Learning Outcomes	Hours	Week
Oral and written exam	Theoretical and practical	Digital Circuits/Logic Circuits	Topic Overview	2	1
Oral and written exam	Theoretical and practical	Boolean Constants and Variables , Truth Tables , Operation with OR, ANd and Not Gats		2	2
Oral and written exam	Theoretical and practical	Describing Logic Circuits Algebraically , Evaluating LogicCircuit Outputs , Implementing Circuits from Boolean Expressions , NOR Gates and NAND Gates		2	3
Oral and written exam	Theoretical and practical	Boolean Theorems - DeMorgan's Theorems		2	4
Oral and written exam	Theoretical and practical	Sum-of-Products Form , Simplifying Logic Circuits		2	5
Oral and written exam	Theoretical and practical	Exam		2	6

Oral and written exam	Theoretical and practical	Karnaugh Map Method		2	7
Oral and written exam	Theoretical and practical	Exclusive-OR and Exclusive-NOR Circuits		2	8
Oral and written exam	Theoretical and practical	Clocked S-R Flip-Flop , Clocked J-K FlipFlop, Clocked D FlipFlop		2	9
Oral and written exam	Theoretical and practical	ARITHMETIC CIRCUITS		2	10
Oral and written exam	Theoretical and practical	Exam		2	11
Oral and written exam	Theoretical and practical	Asynchronous (Ripple) Counters		2	12
Oral and written exam	Theoretical and practical	Synchronous (Parallel) Counters		2	13
Oral and written exam	Theoretical and practical	Multiplexers		2	14
Oral and written exam	Theoretical and practical	Exam		2	15

10. Course Evaluation

Course Assessment	Term Tests	Laboratory	Quizzes	Assignments	Final Exam
	(20%)	)%25(	(5%)	(50%)	(50%)

11. Learning and Teaching Resources

Required textbooks (curricular books, if any)	
Main references (sources)	Ronald J. Tocci "Digital Systems Principles and
Recommended books and references (scientific journals, reports…)	M. Morris Mano Digital Logic and Computer design
Electronic References, Websites	

Course Description Form

1. Course Name:
Programming with MATLAB II
2. Course Code:
PHYS2208
3. Semester / Year:
Second Semester / 2023−2024
4. Description Preparation Date:
18 / 3 / 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:

Dr. Omar Ayad Jalal Email: omar.jalal@nahrainuniv.edu.iq

Suhaib Qusay Abdullah Email: suhaib.qusay@nahrainuniv.edu.iq

Rewasi Ayad Mohamed Email: rewasi.ayad@nahrainuniv.edu.iq

Ahmed Kadhim Uaid Email: ahme.kadhim@nahrainuniv.edu.iq

Sara Mustafa Ibrahim Email: sara.mustafa@nahrainuniv.edu.iq

8. Course Objectives	
Course Objectives	• **Teaching students the basics of the MATLAB language.** • **Teaching students to write advanced MATLAB programs.** • **Teaching the student to solve some physics problems using the MATLAB language.**

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	Control flow I	Control flow I	Experimental	Oral and written exam
2	2	Control flow II	Control flow II	Experimental	Oral and written exam
3	2	Script M−files	Script M−files	Experimental	Oral and written exam
4	2	Functions M−files	Functions M−files	Experimental	Oral and written exam
5	2	Selected Examples I	Selected Examples I	Experimental	Oral and written exam
6	2	Selected Examples II	Selected Examples II	Experimental	Oral and written exam
7	2	Two−Dimensional Graphics	Two−Dimensional Graphics	Experimental	Oral and written exam
8	2	Three−Dimensional Graphics	Three−Dimensional Graphics	Experimental	Oral and written exam
9	2	Text I	Text I	Experimental	Oral and written exam
10	2	Text II	Text II	Experimental	Oral and written exam
11	2	Import and export data	Import and export data	Experimental	Oral and written exam
12	2	Import and export data I	Import and export data I	Experimental	Oral and written exam
13	2	Import and export data II	Import and export data II	Experimental	Oral and written exam
14	2	Selected Examples III	Selected Examples III	Experimental	Oral and written exam
15	2	Selected Examples VI	Selected Examples VI	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:
Partial Differential Equations
2. Course Code:
3. Semester / Year:
Second Semester / Second Class
4. Description Preparation Date:
20/3/2024
5. Available Attendance Forms:
6. Number of Credit Hours (Total) / Number of Units (Total):
45 Hours/ 3Unit
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Ahmed Ayyoub Yousif Email: ahmed.ayyoub@nahrainuniv.edu.iq
8. Course Objectives

Course Objectives	• **The student knows how to solve a differential equation of the first and second order.** • **The student knows how to make a system of differential equations of the first order.** • **The student knows how to use transformations of integration in place of partial differential equations.**

9. Teaching and Learning Strategies	
Strategy	1- Daily Post. 2- Daily Exams. 3- The Monthly Exam. 4- Home Works.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1st & 2nd	6	Introduction to partial differential equations and the separation of variables.		Give Lectures	Daily Exams and H.W.
3rd & 4th	6	Transforming nonhomogeneous Bcs to homogeneous ones and solving more complicated problems.		Give Lectures	Daily Exams and H.W.
5th & 6th	6	Transforming hard equations into easier ones and solving nonhomogeneous PDE using eigenvector expansion method.		Give Lectures	Daily Exams and H.W.

7th & 8th	6	Integral transform (sine and cosine transform.		Give Lectures	Daily Exams and H.W.
9th & 10th	6	The Fourier series and transforms and its application to PDEs		Give Lectures	Daily Exams and H.W.
11th & 12th	6	The Laplace transform and its application to PDEs		Give Lectures	Daily Exams and H.W.
13th & 14th	6	The one dimensional wave equation (hyperbolic equation)		Give Lectures	Daily Exams and H.W.
15th	3	The D'alembert solution of the wave equation and the finite vibrating string (standing waves) and Elliptic type problems (the Laplacian)		Give Lectures	Daily Exams and H.W.

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)	Partial differential equations for scientists a engineers By Stanley J. Farlow
Main references (sources)	
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

Course Description Form

1. Course Name:
Plasma Physics
2. Course Code:
3. Semester / Year:
1st semester / 3rd year physics
4. Description Preparation Date:
17/3/2024
5. Available Attendance Forms: Immanence
6. Number of Credit Hours (Total) / Number of Units (Total)
7. Course administrator's name (mention all, if more than one name)
Name: Assist. Prof. Dr. Hassan N. Hashim Email: hassan.hashim@nahrainuniv.edu.iq
8. Course Objectives

Course Objectives	• learning about the essential principles of plasma physics. • improve the students skills for solving and discussing the applied problems in plasma physics • finding the connection between the theoretical and applied concepts.

9. Teaching and Learning Strategies

Strategy	- Discuss the subjects as in the textbook and the references. - the theoretical lectures include solutions for the problems and discussion for the home works. - Asking the students some tricking questions through the lectures for specific subjects. - Giving the students homework's that need a unique solutions.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Introductory to plasma Physics	**Introduction to Plasma**	Theoretical	Quizzes
2	2	What is Debye Shielding?	**Debye Shielding**	Theoretical	Quizzes

3	2	What is the plasma Parameters	**Plasma Parameters**	Theoretical	Quizzes
4	2	Knowing about the plasma models	**Single Particle Motion**	Theoretical	Quizzes
5	2	What is the motions of single particle under the influence of electric and magnetic fields.	**Plasma Drifts**	Theoretical	Quizzes
6	2	What is the motions of single particle under the influence of electric and magnetic fields.	**Non-uniform B-Field**	Theoretical	Quizzes
7	2	What is the motions of single particle under the influence of electric and magnetic fields.	**Magnetic Mirrors**	Theoretical	Quizzes
8	2		**Test #1**	Written	Written Exam
9	2	What is the invariants in plasma	**Adiabatic invariants**	Theoretical	Quizzes
10	2	What is the classical treatment of plasma	**Classical Treatments**	Theoretical	Quizzes
11	2	How to deal with plasma as fluid	**Fluids Basics**	Theoretical	Quizzes
12	2	How to deal with plasma as fluid	**Plasma as Fluids**	Theoretical	Quizzes
13	2		**Test #2**	Written	Quizzes
14	2		**Summary**	Theoretical	Quizzes
15	3		**Final Examination**	Written exam	Written Exam

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)	✓ "Plasma Physics and controlled fusion" By: F.F. Chen, 3rd Edition, 2016.
Main references (sources)	✓ Plasma physics by Krall & Trivelpiece فيزياء البلازما / الدكتور عاصم عزوز والدكتور رحمن رستم
Recommended books and references (scientific journals, reports…)	Any reference related with plasma physics
Electronic References, Websites	Any website related with plasma physics.

Course Description Form

1. Course Name:

Atomic physics

2. Course Code:

3. Semester / Year: first 2023/2024

4. Description Preparation Date:3/9/2023

5. Available Attendance Forms:present

6. Number of Credit Hours (Total) / Number of Units (Total) 2 hrs. per week/ 2theoretical +2 hrs. per week practical / total;3 units per week

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

Name: Ass. Prof. Dr. Nissan soudoribi
Email:nissan.oribi@nahrainuniv.edu.iq
Zainab Hazem Email: zainab.hazem@nahrainuniv.edu.iq
Saja Qais Email: saja .qais@nahrainuniv.edu.iq
Kawther Mohamed Jaafar Email: kothermohamed1998@gmail.com

8. Course Objectives

Course Objectives	• Understand the advanced concepts in science of atomic physics and spectrum • Linking a theoretical concept with the application • Giving the student the opportunity to solve the equation

9. Teaching and Learning Strategies

Strategy	1- Seminar presentation by students to enhance their skills 2- help students on the scientific discussion during lectures 3- help the student in the solving the problems

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Academic	What is atomic physics and atomic structure	Lecture	discussion
2	2	Academic	Electron configuration	Lecture	discussion
3	2	Academic	The electron orbital diagrams	Lecture	discussion
4	2	Academic	Shell and subshell of orbital	Lecture	discussion
5	2	Academic	Atomic mass unit and determination of e	Lecture	discussion
6	2	Academic	Atomic model	Lecture	discussion

7	2	Academic	Exam	Lecture	Exam
8	2	Academic	Spectrum, types of spectra and X-ray	Lecture	discussion
9	2	Academic	quantum theory :blackbodyradiationand pl radiation law	Lecture	discussion
10	2	Academic	Hydrogen atom spectrum	Lecture	discussion
11	2	Academic	Behr's solution of Hydrogen	Lecture	discussion
12	2	Academic	Elliptic orbital for Hydrogen atom	Lecture	discussion
13	2	Academic	Selection rule and spectral notation Hydrogen and sodium	Lecture	discussion
14	2	Academic	Zeeman effect	Lecture	discussion
15	2	Academic	Exam	Lecture	Exam

11.

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, dailyoral, monthly, or written exams, reports ....etc
40% (25% theoretical +15% practical)mid exam+ discussion+ solving homework+ reports
60% final exam(50% theoretical +10% practical)

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Introduction to atomic and nuclear physics Henry Semat AND John R.ALbright
Main references (sources)	Atomic physics . by :mark fox
Recommended books and references (scientific journals, reports…)	All related international lectures and researcl were dependent
Electronic References, Websites	All books and global sites in the internet

Course Description Form

1. Course Name:

Foundations of Electromagnetic theory I

2. Course Code:

PHY 313

3. Semester / Year:

Second/ 2024

4. Description Preparation Date:

18/3/2024

5. Available Attendance Forms:

Physical attendance

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

3 hours weekly (45 total)/ 3 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	• **The student becomes familiar with the basics of electromagnetic theory.** • **Applying three-dimensional vector mathematics with electric fields.** • **Learn about methods for calculating electric field strength.** • **Characterize and calculate the electric field within materials.**

9. Teaching and Learning Strategies

Strategy	1. Active learning can be encouraged through activities such as discussions, group work, problem-solving, and hands-on projects. 2. Differentiated instruction can be employed to tailor teaching methods to accommodate diverse learning styles, abilities, and interests among students. 3. Feedback and assessment can be provided to students in a timely and constructive manner to help them understand their progress and areas for improvement. A variety of assessment methods can be used to gauge understanding and mastery of the material. 4. Scaffolded learning involves breaking down complex concepts into smaller,

	more manageable steps and gradually building upon prior knowledge to facilitate deeper understanding. 5. Technology integration allows for the incorporation of educational technology tools and resources to enhance learning experiences, facilitate collaboration, and provide access to additional learning materials. 6. Personalization involves getting to know students individually and adapting the teaching approach to meet their specific needs, interests, and learning goals. 7. Reflective practice can be encouraged, where students reflect on their learn experiences, identify challenges and successes, and develop strategies for continu improvement.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Make the student able to perform mathematical operations related to vectors	VECTOR CALCULUS	Whiteboard	Oral and written exams
2	3	Make the student able to understand the importance of Coulomb's law and its application to two or more charges	COULOMB'S LAW	Whiteboard	Oral and written exams
3	3	Provide the student with the ability to calculate the intensity of the electric field resulting from a single point charge or several charges	ELECTRIC FIELD INTENSITY: POINT CHARGE, SEVERAL POINT CHARGE	Whiteboard	Oral and written exams
4	3	Make the student able to calculate the electric field strength for different distributions of charges	ELECTRIC FIELDS DUE TO CONTINUOUS	Whiteboard	Oral and written exams
5	3	Make the student able to calculate the electric flux density and understand the	CHARGE DISTRIBUTIONS, A Line Charge, A	Whiteboard	Oral and written exams

		application of Gauss's law	Surface Charge, A Volume Charge		
6	3	Learning about displacement current and Maxwell's equations	ELECTRIC FLUX DENSITY, GAUSS'S LAW—MAXWELL'S EQUATION	Whiteboard	Oral and written exams
7	3	Applying Gauss's law to find the electric field of a point charge and a linear charge distribution	APPLICATIONS OF GAUSS'S LAW: A. Point Charge, B. Infinite Line Charge.	Whiteboard	Oral and written exams
8	3	Calculating the electric field for a planar and spherical charge distribution	C. Infinite Sheet of Charge,D. Uniformly Charged Sphere	Whiteboard	Oral and written exams
9	3	Giving the student the ability to know how to calculate the electric potential, calculate the electric field from the intensity of the electric field, and calculate the voltage and electric field of a dipole.	ELECTRIC POTENTIAL, electric dipole field and potential	Whiteboard	Oral and written exams
10	3	Make the student able to calculate energy and energy density in the electrostatic field	ENERGY DENSITY IN ELECTROSTATIC FIELDS	Whiteboard	Oral and written exams
11	3	Make the student able to define and understand polarization in dielectric materials	POLARIZATION DIELECTRICS	Whiteboard	Oral and written exams
12	3	Make the student able to recognize the types of insulating materials	DIELECTRIC CONSTANT AND STRENGTH, LINEAR, ISOTROPIC, AND HOMOGENEOUS DIELECTRICS,	Whiteboard	Oral and written exams
13	3	Make the student have the ability to understand the continuity equation	CONTINUITY EQUATION AND RELAXATION TIME,	Whiteboard	Oral and written exams
14	3	The student has the ability to calculate the electric field strength between two different insulating-insulating media	Dielectric-Dielectric Boundary Conditions	Whiteboard	Oral and written exams
15	3	The student has the ability to calculate the electric field	Conductor-Dielectric Boundary Conditions,	Whiteboard	Oral and written exams

		strength between two different media - conductor-insulator and conductor-air	Conductor-Free Space Boundary Conditions		

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 5 Marks
- Final exam 60 Marks

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Elements of Electromagnetics, by Maththew N.O. Sadiku,New York, Oxford, 5th ed., 2011.
Main references (sources)	Foundations of Electromagnetic Theory by Frederick J. Milford, John R. Reitz, and Robert W. Christy. 4th ed.
Recommended books and references (scientific journals, reports…)	Schauum's Series for electromagnetics.
Electronic References, Websites	Internet websites, Like MIT repository edx and others.

Course Description Form

1. Course Name:

Molecule physics

2. Course Code:

3. Semester / Year:2nd 2023/2024

4. Description Preparation Date:1/2/2024

5. Available Attendance Forms:present

6. Number of Credit Hours (Total) / Number of Units (Total) 2 hrs. per week / 2units

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

Name: Ass. Prof. Dr. Nissan soudoribi
Email:nissan.oribi@nahrainuniv.edu.iq

8. Course Objectives

Course Objectives	• Understand the concepts in science of molecule physics and spectrum • Linking a theoretical concept with the application • Giving the student the opportunity to solve all the equation in molecule physics

9. Teaching and Learning Strategies

Strategy	1- Seminar presentation by students to enhance their skills 2- help students on the scientific discussion during lectures 3- help the student in the solving the problems

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Academic	Introduction of molecular physics	Lecture	discussion
2	2	Academic	Classification of molecule	Lecture	discussion
3	2	Academic	Atomic and molecule spectra	Lecture	discussion
4	2	Academic	Rotation of molecule-diatomic rigid molecule	Lecture	discussion
5	2	Academic	Rotation of molecule-diatomic non rigid molecu	Lecture	discussion
6	2	Academic	Population of Rotation levels Rotational spectrumof liner polyatomic molecul	Lecture	discussion
7	2	Academic	Exam	Lecture	Exam

8	2	Academic	Vibrational energy Harmonic vibration of diatomic	Lecture	discussion
9	2	Academic	AnHarmonic vibration of diatomic ''Morse potential''	Lecture	discussion
10	2	Academic	Examples	Lecture	discussion
11	2	Academic	Vibration-Rotation of molecule	Lecture	discussion
12	2	Academic	Electronic energy and spectra	Lecture	discussion
13	2	Academic	Raman spectra	Lecture	discussion
14	2	Academic	Examples	Lecture	discussion
15	2	Academic	Exam	Lecture	Exam

11.

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, dailyoral, monthly, or written exams, reports ....etc
40% mid exam+ discussion+ solving homework+ reports
60% final exam

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Fundamental of molecule spectroscopy By :w.s.struve
Main references (sources)	الفيزياء الجزيئة د.عصام احمد محمود , د.خالد عبدالله
Recommended books and references (scientific journals, reports…)	All related international lectures and research were dependent
Electronic References, Websites	All books and global sites in the internet

Course Description Form

1. Course Name:

Foundations of Electromagnetic theory II

2. Course Code:

PHY 323

3. Semester / Year:

Second/ 2024

4. Description Preparation Date:

18/3/2024

5. Available Attendance Forms:

Physical attendance

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

3 hours weekly (45 total)/ 3 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	• **define the magnetic field and understand the method of calculation.** • **Calculate the magnetic field due to static charge, moving charge, and different current distribution.** • **apply the boundary condition to calculate the magnetic fields between two different media** • **Understand the ways of producing the electric field from the magnetic field and their kinds in addition to determining the direction of generated current** • **Understanding the wave propagation in different types of media**

9. Teaching and Learning Strategies

Strategy	1. Active learning can be encouraged through activities such as discussions, group work, problem-solving, and hands-on projects.

	2. Differentiated instruction can be employed to tailor teaching methods to accommodate diverse learning styles, abilities, and interests among students. 3. Feedback and assessment can be provided to students in a timely and constructive manner to help them understand their progress and areas for improvement. A variety of assessment methods can be used to gauge understanding and mastery of the material. 4. Scaffolded learning involves breaking down complex concepts into smaller, more manageable steps and gradually building upon prior knowledge to facilitate deeper understanding. 5. Technology integration allows for the incorporation of educational technology tools and resources to enhance learning experiences, facilitate collaboration, and provide access to additional learning materials. 6. Personalization involves getting to know students individually and adapting the teaching approach to meet their specific needs, interests, and learning goals. 7. Reflective practice can be encouraged, where students reflect on their learn experiences, identify challenges and successes, and develop strategies continuous improvement.

0. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Make the student able to solve the Electrostatic boundary value problems	Electrostatic boundary value problem: Poisson's and Laplace's equations.	Whiteboard	Oral and written exams
2	3	Make the student know about UNIQUENESS THEOREM, Solving Laplace and Poisson's equations, Resistance, and capacitance.	UNIQUENESS THEOREM, Solving Laplace and Poisson's equations, Resistance and capacitance.	Whiteboard	Oral and written exams
3	3	Make the student know about Parallel plates, spherical and coaxial capacitors. Solving the unit problems.	Parallel plate, spherical and coaxial capacitors. Solving the unit problems.	Whiteboard	Oral and written exams
4	3	Make the student know about Magnetostatic Fields:	Magnetostatic Fields: Biot – Savart Law	Whiteboard	Oral and written exams

		Biot – Savart Law			
5	3	Make the student know about	Ampere's circuit law- Maxwell's equation, Application of Ampere's law	Whiteboard	Oral and written exams
6	3	Make the student know about Magnetic flux density- Maxwell's equation.	Magnetic flux density- Maxwell's equation.	Whiteboard	Oral and written exams
7	3	Make the student know about Maxwell's equations for static Fields	Maxwell's equations for static Fields	Whiteboard	Oral and written exams
8	3	Make the student know about magnetic scalar and vector potentials, and Solving unit problems.	magnetic scalar and vector potentials, Solving unit problems.	Whiteboard	Oral and written exams
9	3	Make the student know about FORCES DUE TO MAGNETIC FIELDS, Force on a Charged Particle	FORCES DUE TO MAGNETIC FIELDS, Force on a Charged Particle	Whiteboard	Oral and written exams
10	3	Make the student know about Force between Two Current Elements, MAGNETIC TORQUE AND MOMENT, A MAGNETIC DIPOLE	Force between Two Current Elements, MAGNETIC TORQUE AND MOMENT, A MAGNETIC DIPOLE	Whiteboard	Oral and written exams
11	3	Make the student know about magnetization in materials, classification of magnetic materials, magnetic boundary conditions, inductors and inductances, magnetic energy	Magnetization in materials, classification of magnetic materials, magnetic boundary conditions, inductors and inductances, magnetic energy	Whiteboard	Oral and written exams
12	3	Make the student know about magnetic circuits, force on magnetic materials	Magnetic circuits, force on magnetic materials	Whiteboard	Oral and written exams
13	3	Make the student know about Faraday's law, transformer and motional emfs, moving loop in static b field (motional	Faraday's law, transformer and motional emfs, moving loop in static b field (motional emf), moving loop in time-varying field	Whiteboard	Oral and written exams

		emf), moving loop in time-varying field			
14	3	Make the student know about Displacement current, Maxwell's equations in final forms, time-varying potentials, and time-harmonic fields.	Displacement current, Maxwell's equations in final forms, time-varying potentials, and time-harmonic fields.	Whiteboard	Oral and written exams
15	3	Make the student know about Waves in general, wave propagation in lossy dielectrics, and plane waves in good conductors.	Waves in general, wave propagation in lossy dielectrics, plane waves in good conductors.	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 5 Marks
- Final exam 60 Marks

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Elements of Electromagnetics, by Maththew N.O. Sadiku,New York, Oxford, 5th ed., 2011.
Main references (sources)	Foundations of Electromagnetic Theory by Frederick J. Milford, John R. Reitz, and Robert W. Christy. 4th ed.
Recommended books and references (scientific journals, reports…)	Schauum's Series for electromagnetics.
Electronic References, Websites	Internet websites, Like MIT repository edx and others.

Course Description Form

1. Course Name:

Electronics II

2. Course Code:

PHYS323

3. Semester / Year:

Third/2nd sem. 2023-2024

4. Description Preparation Date:

1/2/2024

5. Available Attendance Forms:

Physical attendance

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

3 Hours Theory+ 4 Hours Lab.

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

Teaching Staff of the Lab:

Lect. Zainab Khalid, Assis. Lect. Wessam Mohammed, Assis Lect. Raghad Saad

Assis. Lect. Samah Sabah, Assis. Lect. Saja Qais, Hussein Majed

8. Course Objectives

Course Objectives	1. Understanding the principles of bipolar junction transistors (BJTs), including their modes operation (e.g., cut-off, saturation, active). 2. Studying and Analyzing the characteristics and applications of field-effect transistors (FETs), and MOSFETs 3. Studying and analyzing basic amplifier circuits using BJTs and FETs.

9. Teaching and Learning Strategies

Strategy	• Discussing the selected important topics in the reference books • Theoretical lectures include solved problem • Asking students a set of thinking questions during lectures on specific topics. • Giving students homework that requires finding their solutions. • Doing some practical experiments in the laboratory that support the theoretical lectures • Guiding students to prepare reports for practical experiments in the laboratory

10. Course Structure (Theoretical Part)					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
1	3	The student must have the ability to know the basic structure of a bipolar junction transistor BJT and how it works.	Bipolar Junction Transistor (BJT) Structure and its Basic Operation	Whiteboard and LCD	Oral and written exams
2	3	The student must have the ability to know the characteristics and basic parameters of a bipolar transistor.	BJT Characteristics and its Parameters	Whiteboard and LCD	Oral and written exams
3	3	The student can understand and know the work of the bipolar junction transistor as an amplifier: the common emitter amplifier	The BJT as an Amplifier: The Common-Emitter Amplifier	Whiteboard and LCD	Oral and written exams
4	3	The student can understand and know the work of the bipolar junction transistor as an amplifier: the common collector amplifier	The BJT as an Amplifier: The Common-Collector Amplifier	Whiteboard and LCD	Oral and written exams
5	3	The student can understand and know the work of the bipolar junction transistor as an amplifier: the common base amplifier	The BJT as an Amplifier: The Common-Base Amplifier	Whiteboard and LCD	Oral and written exams
6	3	The student must have the ability to understand and know how a bipolar	The BJT as a Switch	Whiteboard and LCD	Oral and written exams

		junction transistor works as a switch			
7	3	Evaluate the Students	First Mid Exam		written exams
8	3	The student must have the ability to understand and know the transistor bias circuit	Transistor Bias Circuit	Whiteboard and LCD	Oral and written exams
9	3	The student must have the ability to understand and know the voltage divider bias	Voltage-Divider Bias	Whiteboard and LCD	Oral and written exams
10	3	The student must have the ability to understand and know the characteristics and basic parameters of the field effect transistor	JFET Characteristics and Parameters	Whiteboard and LCD	Oral and written exams
11	3	The student must have the ability to understand and know the junction field-effect transistor bias	JFET Biasing	Whiteboard and LCD	Oral and written exams
12	3	The student must have the ability to understand and know the characteristics and basic parameters of the metal oxide semiconductor field effect transistor	MOSFET Characteristics and Parameters	Whiteboard and LCD	Oral and written exams
13	3	The student must have the ability to understand and know the metal oxide semiconductor field-effect transistor bias	MOSFET Biasing	Whiteboard and LCD	Oral and written exams

14	3	Evaluate the Students	Second Mid Exam	Whiteboard and LCD	written exams
15	3	Review previous lessons	Summary	Whiteboard and LCD	Oral and written exams

11. Course Structure (Experimental Lab.)

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	Practical training for the student on the experiment of transistors as amplifiers 1 and 2	Transistor as amplifier 1+2	Practical experiments	Reports and written exams
2	4	Practical training for the student on the experiment of Transistor as a switch	Transistor as switch	Practical experiments	Reports and written exams
3	4	Practical training for the student on the experiment of Differential amplifier	Differential amplifier	Practical experiments	Reports and written exams
4	4	Practical training for the student on the experiment of Operational amplifier	Operational amplifier	Practical experiments	Reports and written exams
5	4	Practical training for the student on the Application of operational amplifier	Application of operational amplifier	Practical experiments	Reports and written exams
6	4	Practical training for the student on the experiment of the junction field-effect transistor	JFET	Practical experiments	Reports and written exams
7	4	Practical training for the student on the	MOSFET	Practical experiments	Reports and written exams

		experiment of metal oxide semiconductor field-effect transistor			

12. Course Evaluation

40 Marks divided into two parts:

- The theoretical Lectures: 25 marks (includes monthly exams, daily tests, and homework)
- The experimental lab. : 15 marks (the grade includes daily reports and tests)

The final exam score is 60 and is divided into two parts:

- The final exam for the theoretical lectures is 50 Marks
- The final exam for the experimental lab. :10 Marks

13. Learning and Teaching Resources

Required textbooks (curricular books, if any)	• Electronic Devices, Thomas L. Floyd, 9th edition, Pearson Education International, 2012.
Main references (sources)	• Electronic Devices, Tocci, 3rd edition, Charles E. Merrill Publishing Company, 1983.
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

Course Description Form

1. Course Name:
Numerical Analysis
2. Course Code:
PHYS3205
3. Semester / Year:
Second Semester / 2023-2024
4. Description Preparation Date:
18 / 3 / 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 Fatima Muqdad Ahmed Email: fatima.muqdad@nahrainuniv.edu.iq Reem Yasir Mahmood Email: reem.yasir@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	Raphsen-Newton method	Raphsen-Newton 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	linear -Solution of non system (Newton's	Theoretical	Oral and

		(Newton's method)	method)	and Experimental	written exam
15	2	-Solution of non linear system (iteration method)	linear -Solution of non 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:
Mathematical Physics
2. Course Code:
3. Semester / Year:
2nd Semester/ 3rd year Physics
4. Description Preparation Date:
17/3/2024
5. Available Attendance Forms:
Immanence
6. Number of Credit Hours (Total) / Number of Units (Total)
30hr/ 2unit
7. Course administrator's name (mention all, if more than one name)
Name: Assist. Prof. Dr. Hassan N. Hashim Email: hassan.hashim@nahrainuniv.edu.iq

8. Course Objectives

Course Objectives	• Teaching the students the principles of Mathematical Physics. • Give the Students the ability and experience to solve and discuss the problems related with Mathematical Physics. • Make a connection between the theoretical principles and the experimental applications.

9. Teaching and Learning Strategies

Strategy	- Discussing the subjects syllabus of the text book and the related references. - The attendance lectures contains solving problems and discussions for the homework. - Asking the students different thinking questions throughout the lectures in a specific subjects related to mathematical Physics. - Giving the students homework that need self-solutions.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2		**Introduction Special functions:**	Theoretical	Quizzes

			The Factorial Function		
2	2		**Gamma Function**	Theoretical	Quizzes
3	2		**The Gamma function of negative number**	Theoretical	Quizzes
4	2		**Some important formulas involving Gamma Function**	Theoretical	Quizzes
5	2		**Solutions of some Examples**	Theoretical	Quizzes
6	2		**Beta Function**	Theoretical	Quizzes
7	2		**Other forms of Beta Function**	Theoretical	Quizzes
8	2		**The Relation between Gamma and Beta functions**	Theoretical	Quizzes
9	2		**The Error function**	Theoretical	Quizzes
10	2		**Test #1**	Theoretical	Writing Test
11	2		**Series: Solutions of Differential Equations**	Theoretical	Quizzes
12	2		**Legendre's Equation**	Theoretical	Quizzes
13	2		**Test #2**	Theoretical	Writing Test
14	2		**Summary**	Theoretical	
15	3		**Final Examination**		Writing Exam

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)	✓ "**Mathematical Methods in the Physical Sciences**" By: Mary L. Boas , 2nd Edition, 1983.
Main references (sources)	✓ **Advanced Calculus**, 3rd Edition, Angus E. Taylor, and W. Robert Mann, 1983.
Recommended books and references (scientific journals, reports…)	Any Book related with the following titles: 1. Mathematical Methods 2. Applied Mathematics for Physicists and Engineers. 3. Mathematical Physics.
Electronic References, Websites	Any website with the above titles.

Course Description Form

1. Course Name:
Laser physics (1)
2. Course Code:
3. Semester / Year:
2024−2023
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
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	Discuss the topics of the methodological book and auxiliary references 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	

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. Ammar abd al satter (practical)

ث. Saja hazem(practical)

ج. 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	2023-2024
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.

Course Description Form

1. Course Name:
First
2. Course Code:
3. Semester / Year:
2023−2024
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: Dr.Narjis Zamil Abdulzahra Email: ner_ner2@yahoo.com

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

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:
Laser physics (2)
2. Course Code:
3. Semester / Year:
2 nd −2024−
4. Description Preparation Date:
2024
5. Available Attendance Forms:
Attending
6. Number of Credit Hours (Total) / Number of Units (Total)
3 hours per week (theoretical)
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Wildan Wohammed Awad Email: wildan.awad@nahrainuniv.edu.iq
8. Course Objectives

Course Objectives	• **Teaching the student the basics of laser physics .** • **Teaching the student the properties of the laser beam and the possibility of entering the applied fields**

9. Teaching and Learning Strategies	
Strategy	Discuss the topics of the methodological book and auxiliary references 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.	3	Study Laser mode	Laser mode	theoretical	Daily oral and written exam
2.	3	Distinguish between longitudinal and transverse patterns	longitudinal and transvers patterns	theoretical	Daily oral and written exam
3.	3	Knowledge of the nature of laser beams	the nature of laser beams	theoretical	Daily oral and written exam
4.	3	Natural line broadening	Natural line broadening	theoretical	Daily oral and written exam
5.	3	Q switching	Q switching	theoretical	Daily oral and written exam
6.	3	Understand quality factor switching methods	quality factor switching methods	theoretical	Daily oral and written exam
7.	3	mood looking	mood looking	theoretical	Daily oral and written exam
8.	3	Methods of mood looking	Methods of mood looking	theoretical	Daily oral and written exam
9.	3	Laser types	Laser types	theoretical	Daily oral and written exam
10.	3	Study Solid state laser	Solid state laser	theoretical	Daily oral and written exam
11.	3	Study Gas laser	Gas laser	theoretical	Daily oral and written exam
12.	3	Study Liquid laser	Liquid laser	theoretical	Daily oral and written exam
13.	3	Study Semiconductor laser	Semiconductor laser	theoretical	Daily oral and written exam
14.	3	Study laser application	Laser application	theoretical	Daily oral and written exam
15.	3	How to protect against laser rays	Laser safety	theoretical	Daily oral and written exam

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as : 15 daily preparation, daily oral, and 25 written exams, 60 final exams

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:
Nuclear Physics
2. Course Code:
3. Semester / Year:
Second / 2024
4. Description Preparation Date:
2024/3/30
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: Assist. Prof. Dr. Marwa Abdul Muhsien Email: marwa@nahrainuniv.edu Name: Assist. Lect. Zaid M. Abbas Email: zaid.malk@nahrainuniv.edu.iq
8. Course Objectives

Course 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.
9. Teaching and Learning Strategies	
Strategy	1. Solve various problems in different Nuclear physics applications in class. 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.

10. Course Structure					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
1	2		Radiation		Oral exams
2	2		Properties of nuclei		Oral exams
3	2		Binding Energy		Oral exams
4	2		Nuclear Forces		Quizzes
5	2		Interaction of radiation with matter		Homework
6	2		Interaction of electron with matter		Homework
7	2		Nuclear Reactors		Seminar
8	2		Types of Nuclear Reactors		Homework
9	2		Accelerators		Quizzes
10	2		Radiation dose		Quizzes
11	2		Radiation in Medicine		Seminar
12	2		Radiation therapy		Quizzes
13	2		Radiation application in medicine		Homework
14	2		Radiation safety in nucle medicine		Homework
15					

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)	Elements of Nuclear Physics, Walter E. Meyerhof ; McGraw-Hill (January 1, 1967)
Main references (sources)	

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

Course Description Form

1. Course Name:

Solar Physics

2. Course Code:

PHYS425

3. Semester / Year:

Fourth/2nd sem. 2023-2024

4. Description Preparation Date:

1/2/2024

5. Available Attendance Forms:

Physical attendance

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

2 Hours/2 Units

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

Name: Assis. Prof. Dr. Jazeel Hussein Azeez

Email: Jazeel.azeez@nahrainuniv.edu.iq

8. Course Objectives

Course Objectives	1. Learn the basics of solar physics and study the laws that govern this science. 2. Understanding the structure and composition of the Sun's interior, including its core, radiative zone, and convective zone. 3. Studying the Sun's atmosphere, including its layers such as the photosphere, chromosphere, and corona. 4. Understanding solar phenomena such as sunspots, solar flares, coronal mass ejections (CMEs), and solar prominences. 5. Explaining observational techniques and instruments used in solar physics, including telescopes, and space-based observatories.

9. Teaching and Learning Strategies

Strategy	1. Ask direct oral questions. 2. Scientific reports and daily assignments. 3. Short daily quizzes. 4. Give various problems at the end of each chapter to guide the student to the correct scientific solution. 5. Monthly exams with various questions and multiple choices. 6. Final exams.

10. Course Structure					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
1	2	Students have general knowledge of the solar system	Introduction	Whiteboard and LCD	Oral and written exams
2	2	Students can understand the importance of studying the sun	A Brief Overview of the Sun.	Whiteboard and LCD	Oral and written exams
3	2	Students can learn the basic information and physical properties of the sun	Solar Parameters	Whiteboard and LCD	Oral and written exams
4	2	Students can learn the observation techniques in solar physics	Instrumentation and Observational Techniques in Solar Physics.	Whiteboard and LCD	Oral and written exams
5	2	Students can understand the inner layers of the sun	Solar Interior.	Whiteboard and LCD	Oral and written exams
6	2	Students know about The Active and Explosive Sun	The Active and Explosive Sun.	Whiteboard and LCD	Oral and written exams
7	2	Students can learn the Solar Magnetic field	Solar Magnetic field.	Whiteboard and LCD	Oral and written exams
8	2	Students can understand the outer layers of the sun	Solar Atmosphere.	Whiteboard and LCD	Oral and written exams
9	2	Evaluate the students	First mid exam	Whiteboard and LCD	Oral and written exams
10	2	Students study some activities of the sun like sunspots, solar flares.	Solar Activity-Part 1	Whiteboard and LCD	Oral and written exams
11	2	Students study some activities of the sun like coronal mass ejections	Solar Activity-Part 2	Whiteboard and LCD	Oral and written exams

		(CMEs), and solar prominences			
12	2	Students study the rotation of the sun and compare it to the rotation of the Earth.	Solar Rotation.	Whiteboard and LCD	Oral and written exams
13	2	Students have knowledge about the solar eclipses and its types	Solar Eclipses	Whiteboard and LCD	Oral and written exams
14	2	Evaluate the students	Second mid exam	Whiteboard and LCD	Oral and written exams
15	2	The student prepares a report on some topics related to the sun	Seminar	Whiteboard and LCD	Oral and written exams

11. Course Evaluation

40 Marks (Mid exam + Homework+ Quizzes)
60 Marks Final Exam

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Physics of the Sun By: Dermott J. Mullan @Taylor & Francis Group, LLC 2009
Main references (sources)	New Millennium Solar Physics By : Markus J. Aschwanden @Springer Nature Switzerland AG 2019
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

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/	