Ministry of Higher Education
and Scientific Research
University of Babylon
College of Science
Department of Physics

وزارة التعليم العالي
والبحث العلمي
جامعة بابل
كلية العلوم
قسم الفيزياء

Academic Program and Course Description for the Bologna Path

Department of Physics

College of Science

2025–2026

Academic Program and Course Description Guide for the Bologna Path

University Name: University of Babylon
Faculty/Institute: College of Science
Scientific Department: Department of Physics

Academic or Professional Program Name: Physics

Final Certificate Name: B.Sc., M.Sc., and Ph.D. Degrees in Physics

Academic System: The academic system of the study is Courses

Description Preparation Date: / / 2026
Completion Date: / / 2026

جامعة بابل / كلية العلوم
قسم الفيزياء

Signature:

Head of Department Name:
Dr. Samira Adnan Mahdi

Date: 26/4/ 2026

أ.د. أحمد سعدون عباس
معاون العميد للشؤون العلمية

Signature: Ahmad S

Scientific Associate Name:
Dr. Ahmed Sadoon Witwit

Date: / / 2026

The file is checked by:
Department of Quality Assurance and University Performance

Director of the Quality Assurance and University Performance Department

Signature:

Date: / / 2026

UNIVERSITY OF BABYLON - COLLEGE OF SCIENCE

Approval of the Dean

Signature: mohamme

Date: 26/4 / 2026

Introduction

The Physics Program at the College of Science is a distinguished academic program that aims to provide an integrated education combining theoretical foundations with practical skills across various branches of physics. The program strives to prepare graduates with strong scientific analytical abilities and critical thinking skills, in addition to the capacity to apply physical knowledge in solving modern scientific and technological problems.

This program is considered one of the vital academic tracks that contributes to preparing outstanding scientific cadres capable of keeping pace with rapid advancements in science and technology. It seeks to equip students with in-depth knowledge of the fundamental principles of physics and its diverse fields such as theoretical physics, applied physics, nuclear physics, materials physics, and energy physics, with an emphasis on practical and technical aspects that enhance their employability in multiple sectors.

Special attention is given to developing students' skills in scientific research and experimentation through advanced laboratories and graduation projects that are closely connected to real-world scientific and practical contexts. The program also aims to strengthen students' competencies in using modern technologies and scientific software for analysis and simulation, in line with the requirements of the Fourth Industrial Revolution and digital transformation in education and research. Moreover, the department is keen on building bridges of collaboration with research centers and international universities to enhance opportunities for training and academic exchange, thereby raising graduates' competencies and enabling them to compete in the local, regional, and global job markets. In this way, the academic program in the Physics Department serves as a cornerstone for preparing a generation of scientists and researchers qualified to contribute to community service and to advancing scientific and technological progress.

The program is distinguished by providing an interactive learning environment that includes lectures, laboratories, and research projects, while encouraging students to innovate and participate in research activities in collaboration with scientific institutions locally and internationally. It also endeavors to achieve quality standards and academic accreditation, ensuring that educational outcomes align with labor market needs and scientific and technological developments.

Through this program, students are able to develop their scientific and research skills, becoming capable of making effective contributions to scientific advancement and community service.

1.Program Vision

The Physics Program aspires to achieve leadership and excellence in education by preparing physicists with a solid foundation of knowledge and advanced practical skills, enabling them to integrate into the labor market and contribute effectively to scientific and technological development at the local, regional, and global levels**.**

2. Program Mission

The program seeks to provide students with comprehensive knowledge in both fundamental and applied fields of physics, while developing their scientific and practical skills to enable innovation, research, and problem-solving. It also aims to prepare qualified graduates capable of serving the community and contributing to scientific advancement in accordance with quality assurance and academic accreditation standards.

3. Program objectives

The Program Aims to:

1- Provide advanced education that combines deep theoretical understanding with practical applications in various fields of physics.

2-Prepare qualified graduates with a solid scientific foundation in general physics and medical physics, enabling them to compete effectively in the job market.

3-Develop research skills and encourage students and faculty members to conduct high-quality research and publish in reputable international journals.

4-Enhance students' practical and applied skills by strengthening laboratory-based education and linking it to theoretical knowledge.

5-Contribute to community service by providing scientific and practical solutions to challenges faced by educational, healthcare, and other national sectors.

6-Achieve quality assurance and academic accreditation standards locally and

internationally to ensure continuous improvement and sustainability of the program.

7-Qualify academic and technical staff through continuous training and professional development to keep pace with scientific and educational advancements.

8-Provide an integrated learning environment through advanced infrastructure that includes well-equipped classrooms with modern teaching facilities, specialized laboratories, as well as precise scientific instruments and advanced laboratory tools

4. Program Accreditation

The program has not yet obtained program accreditation; however, it is in the process of seeking to achieve it.

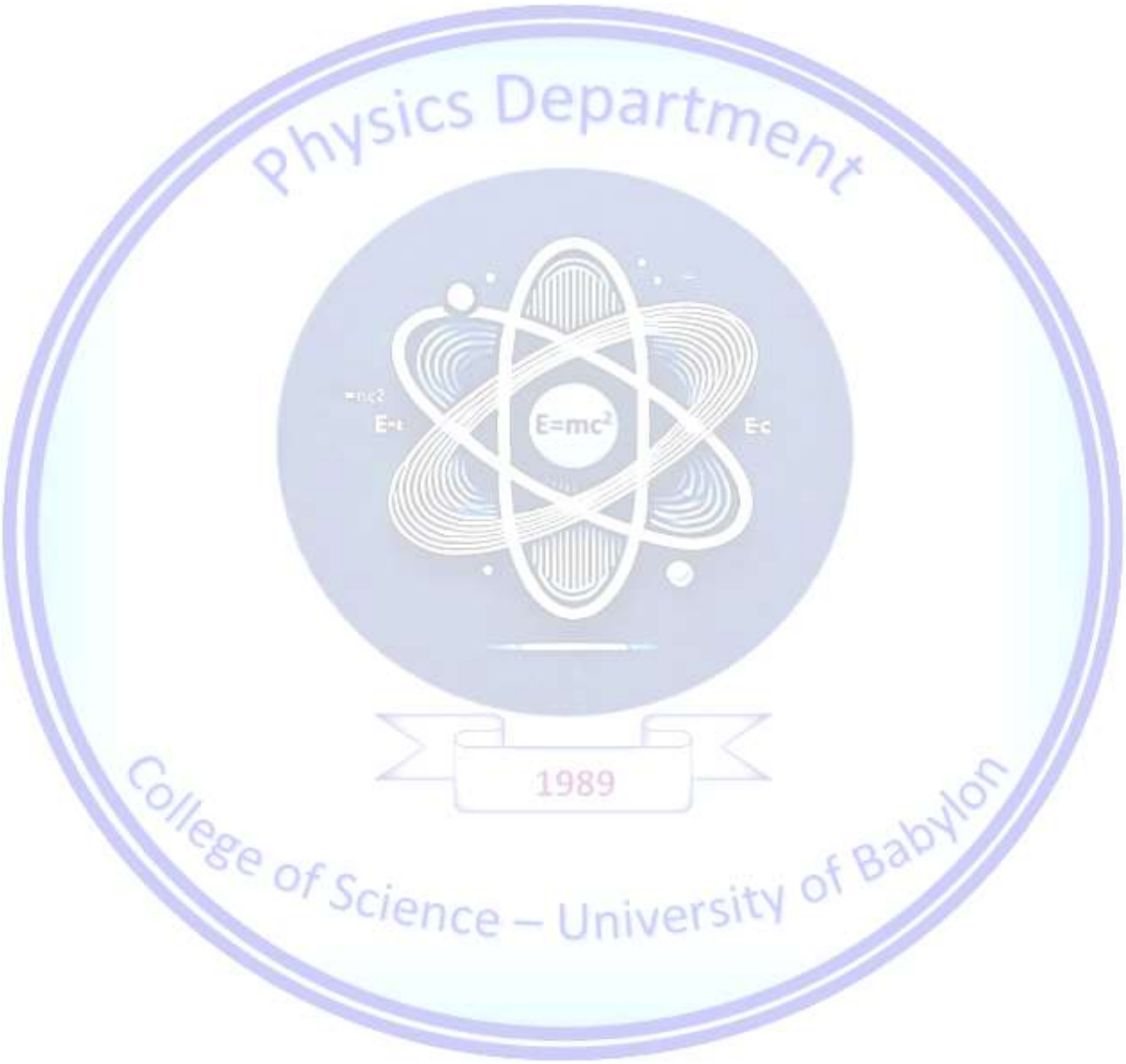
5. Other External influences

Training courses for students to develop professional skills / field visits / practical part

6. Program Structure

Program Structure	Number of Courses	Credit hours	Percentage	Reviews*
Orzanization Reqirements	**7**	**16**	**% 15.2**	
College Reqirements	**5**	**29**	**%24.11**	
Departmant Requiremets	**38**	**160**	**%71.56**	
Summer Training	**existing**	**/**		

Other				**Scientific Visits**



7 . Program Discription

Year	Course code	Course name	Credit Hours	
			theoretical	practical
First Stage / First Course				
	PHY1112	Mechanics and properties of Matter (1)	2	2
First Stage	PHY1111	Electricity	2	2
	BAB0503014	Computers (1)	2	
	PHY1113	Mathematic (1)	2	
		Democracy and Humans Rights	2	
	UOBAB0503016	Arabic Language	2	
	First Stage / Second Course			
	PHY1201	Mechanics and properties of Matter (2)	2	2
	PHY1202	Magnetism	2	2
	PHY1205	General Astronomy	2	
	PHY1213	Mathematics (2)	2	
	PHY1204	General Chemistry	2	2
	UOBAB0503026	English Language (1)	2	
Second Stage / First Course				
	PHY2312	Modern Physics (1)	2	2
	PHY2315	Heat and Thermodynamic	2	2
	PHY2304	Analytical Mechanic (1)	2	
Second Stage	PHY2311	Analog Electronics	2	2
	PHY2303	Mathematics (3)	2	
	UOBAB0503036	English language (2)	2	
	Second Stage / Second Course			
	PHY2401	Modern Physics (2)	2	2
	PHY2402	Statistical Thermodynamic	2	2
	UOBAB0503016	Arabic Language	2	
	PHY2403	Digital Electronics	2	2
	UOBAB0503045	Computers (1)	2	2
	UOBAB0503046	Baath crimes of Iraq	2	

8. Expected Learning outcomes of the program

A-Knowledge	Learning Outcomes
A 1. Explain the fundamental and advanced principles of general physics and medical physics, along with their scientific and practical applications. **A 2.** Demonstrate an understanding of the fundamental principles and theories of classical physics (mechanics, thermodynamics, electromagnetism, and optics), as well as familiarity with quantum physics, nuclear physics, and modern physics. **A 3.** Understand the mathematical and statistical methods used in analyzing physical phenomena. **A 4.** Demonstrate knowledge of using modern tools and techniques in physics laboratories	Explain the fundamental and advanced principles of general physics and its branches, and demonstrate an understanding of physical theories and their scientific and technological applications in various fields
B- Skills	**Learning Outcomes**
B 1. Perform and conduct specialized physics experiments, in addition to operating diagnostic and therapeutic medical devices efficiently. **B 2.** Analyze physical data and extract results using modern software and technologies. **B 3.** Develop critical thinking and self-learning skills to ensure continuous learning and effective performance. **B 4.** Write clear and well-structured scientific reports using precise physical terminology.	Efficiently and accurately use laboratory instruments and equipment in conducting physics experiments, applying modern measurement methods, and analyzing results using scientific and statistical software
C-Ethics	**Learning Outcomes**
C 1. Commit to professional and ethical conduct in all medical, physical, and research environments. **C 2.** Demonstrate strong ability to communicate effectively with both specialists and non-specialists, while showing respect for cultural diversity and inclusiveness. **C 3.** Exhibit a sense of social responsibility and actively contribute to initiatives that promote public health and serve the community. **C 4.** Contribute to community service by applying physics knowledge to real-world challenge	Commit to academic integrity in teaching, research, and scholarly activities, adhere to professional ethics, and demonstrate responsibility in applying physics knowledge to serve society, while upholding accountability toward the community and the environment by employing physics to provide solutions to real-world problem

9.Teaching and Learning Strategies

Teaching Strategies	Learning Strategies
1.presentations and multimedia, while encouraging discussions and questions to enhance critical thinking. **2.Laboratories and experiments**: developing students' practical skills through laboratory experiments and training them to use modern equipment and analyze results. **3.Problem-based learning**: presenting physics problems related to scientific or industrial real-world scenarios and motivating students to find innovative solutions. **4.Collaborative and group research projects**: conducting research, scientific reports, projects, and activities within groups to enhance communication and teamwork skills. **5.Use of educational technology**: employing learning management systems, scientific software, and computer simulations to clarify physics concepts. **6.Field training and scientific visits**: linking theoretical and practical aspects through training in research centers and specialized laboratories.	**1.**Focus on fundamental physics concepts and understanding them. **2.**Use of multiple representations (drawings, equations, graphs) to clarify concepts. **3.**Engaging students in class through activities such as: group discussions, solving problems in teams, mini in-class experiments, and digital simulations. **4.**Intensive use of laboratories for hands-on learning. **5.**Using experiments simulating medical scenarios (for students in medical physics). **6.**Training students to use medical devices related to physics, such as X-ray machines, MRI, ultrasound, and others. **7.**Providing practical examples linking physics concepts to medical applications, for example: Newton's laws in blood flow, electricity and magnetism in heart function and medical devices, and nuclear physics in radiation medicine.

10 . Evaluation methods

1. Examinations, which are of two types:
   - Written exams: including multiple-choice questions (MCQs), essay questions, or mputational problems to assess the understanding of physical theories and principles.
   - Quizzes: short tests to evaluate students' understanding of concepts during or between ures.
   - Laboratory reports: assessing the ability to conduct experiments, record data, and analyze lts.
   - Homework and formative quizzes: providing continuous feedback to improve performance ore final examinations.
   - Progress reports for projects and research: monitoring students' progress and providing dback to enhance performance continuously.
   - Presentations: evaluating scientific communication skills and the ability to present results n organized manner.

11.Faculty

Faculty Members

Academic Rank	Specialization		Special Requirements/Skills (if applicable)		Number of the teaching	
	General	Special			Staff	Lecturer
Abdul Aziz Obaid Musa Imran Al-Akeili					√	
Mohammed Abdul Amir Karim Abbas Al-Sharifi					√	
Khaled Hussein Hatem Al-Attiyah					√	
Naheeda Bakhit Hassan Al-Jaafari					√	
Mohsen Kazim Mutalib Dagher Al-Janabi					√	
Haider Mohammed Abdul Jalil Abboud Al-Khafaji					√	
Rabab Saadoun Abdoun Al-Dami					√	
Ban Ali Nasser Ghaleb					√	
Mohammed Hadi Shaneen Abdul Ali Al-Shammari					√	
Nihad Abdul Amir Saleh Khudair Al-Mamouri					√	
Amira Abu Al-Soud Hammadi Mahjaj					√	
Hekmat Adnan Jawad Kazim Bani Muslim					√	
Musa Kazim Mohsen Khalil Al-Aujani					√	
Nidal Mohammed Obaid Mutab Al-Sharifi					√	
Rawaa Mazhar Obaid Al-Fahnhrawi					√	
Samira Adnan Mahdi Haran Al-Jubouri					√	
Mohammed Ghanem Mardan Al-Khafaji					√	
Nihal Abdullah Abdul Wahab Al-Kim					√	
Saba Abdul Zahra Obaid Al-Rubaie					√	
Ali Madloul Ne'mah					√	
Nassar Abdul Amir Hamza Dawood Al-Issawi					√	
Abbas Ibrahim Abis Al-Zuhairi					√	
Hussein Hakim Abdul Breesam					√	
Maan Abdul Amir Saleh Al-Maamouri					√	
Laith Talib Hadi Qaddouri					√	
Mohsen Kazem Abdul Hussein					√	
Rasul Abdul Amir Ghazi					√	
Fuad Hamza Abdul Nasser Al-Sharifi					√	
Wasanaa Jaafar Hamad Watout					√	
Hanan Dakhel Eidan Al-Saadi					√	
Nour Amer Ne'mah Ibrahim					√	
Ibtisam Imran Radhi Al-Jilawi					√	
Ghaida Abdul Hafeez Jaber Al-Shammari					√	
Enaam Mahdi Jaber					√	
Hakima Salman Jabr Murshid					√	
Elhaq Abdul Muslim Hassan Sakban					√	
Alia Hafzi Abbas					√	
Saif Mohammed Nemah Hantoush Al-Ghazali					√	
Ali Taama Mukhlif					√	
Nour Al-Huda Talib Ahmed Aziz					√	
Faten Diaa Fahim Abdul Amir					√	
Fadel Hassan Ali Saleh					√	
Aseel Majed Habib Abd					√	
Muammar Hassan Eidan Abboud					√	

Ali Khalis Anfous					√	
Fatima Sattar					√	
Afrah Mohammed Abdul Amir Muhaisen					√	
Ruaa Qahtan Mohammed Mazloum					√	
Mrs. Zeina Sattar Hamad Jarallah Al-Jarallah					√	
Tabarak Falah Naji Salem					√	
Dhu Al-Fiqar Ali Hamid Khalaf					√	
Rafl Ali Jawad Kazim					√	
Reem Taama Yousef Muwazen					√	
Ruwa Salam Kazim Jaber					√	
Zahraa Ali Nayef Hamza					√	
Sara Sabah Ahmed Mohammed					√	
Abeer Salim Abdul Karim Ashkah					√	
Surur Taha Yassin Khudair					√	
Hussein Ali Madlul Dahi					√	
Noor Al-Huda Saleh Hadi Jaber					√	
Amani Ali Sakb Abis					√	
Sara Mohammed Khalil Alawi					√	
Rania Mahmoud Mohammed					√	
Manal Marzah Hadi Kazim					√	
Ayed Fadel Mishir Mishal					√	
Nour Raed Hadi Ismail						
Ilaf Mahdi Mohammed Alwan						
Saba Salem Nehme						

12.Professional Development

Mentoring new faculty members

1- Familiarize them with the academic environment: such as university systems, regulations, academic traditions, and available services.

2. Improve teaching skills: by equipping them with active learning strategies, assessment, use of technology, classroom management, and interaction with students.

3. Enhance research capabilities: such as research preparation methods, scientific publishing, and research ethics.

4. Support personal and professional development, such as communication skills, time management, and teamwork.

5. Encourage professional interaction: by building support networks and sharing experiences with colleagues and experienced professors

Professional development of faculty members

1. Improving the quality of university education.

2. Keeping pace with scientific and technological developments in various disciplines.

3. Developing teaching and assessment skills and employing active learning strategies.

4. Enhancing research productivity and increasing opportunities for scientific publication in reputable journals

5. Developing leadership and administrative skills to contribute to the

development of academic institutions.
6. Achieving student satisfaction and quality learning outcomes.
7. Workshops and training courses (in-person or online).
8. Fellowship and academic exchange programs.

15 . Program Development Plan

10. Scientific conferences and seminars.
11. Practical and field training within or outside the institution.
12. Professional communities and learning groups.
13. Academic advising and mentoring.
14. Involving faculty members in planning and evaluation, in addition to strong administrative and institutional support.

13 . Acceptance Criterion

Centralized Admission

14 . The most important source of information about the program

•Academic textbooks
• Other scientific resources (scientific research, scientific articles, theses, and dissertations)
• Encyclopedias such as Wikipedia

• Utilizing scientific libraries and the internet

Updating the study plans to keep pace with the latest scientific and knowledge developments.

Introducing new courses that promote interactive learning and strengthen the role of practical laboratories.

Supporting graduation projects with an applied orientation through collaboration with research centers inside and outside the university.

Aligning the academic program with international accreditation standards such as ABET, and national quality standards such as NCAAA in Saudi Arabia.

Developing a continuous assessment system for both students and courses to ensure the quality of the educational process.

Organizing training workshops for faculty members on modern teaching methods and strategies.

Encouraging the participation of faculty and students in international conferences, and attracting distinguished researchers from abroad to enhance knowledge exchange.

Implementing awareness programs in schools and the local community, and holding

Program Skills Outline																
				Required program Learning outcomes												
Year/Level	Course Code	CourseName	Basic option	Knowledge				Skills				Ethics				
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4	
First Stage	PHY1112	Mechanics and properties of Matter (1)	Basic	*	*	*		*	*		*		*	*		
	PHY1111	Electricity	Basic	*		*	*	*	*			*	*			
	BAB0503014	Computers (1)	Basic	*						*			*	*	*	
	PHY1113	Mathematic (1)	Basic					*	*				*	*		
		Democracy and Humans Rights	Basic										*		*	
	UOBAB0503016	Arabic Language	Basic										*	*		
	PHY1201	Mechanics and properties of Matter (2)	Basic	*		*	*		*	*	*	*	*			
	PHY1202	Magnetism	Basic	*	*		*	*	*		*	*	*		*	
	PHY1205	General Astronomy	Basic		*	*	*	*				*		*		
	PHY1213	Mathematics (2)	Basic					*	*	*			*	*		
	PHY1204	General Chemistry	Basic	*					*		*		*	*	*	
	UOBAB0503026	English Language (1)	Basic										*	*		
Second	PHY2312	Modern Physics (1)	Basic		*	*	*		*		*	*	*			
	PHY2315	Heat and Thermodynamic	Basic	*	*		*	*	*		*		*		*	
	PHY2304	Analytical Mechanic (1)	Basic			*	*	*	*		*	*			*	

Stage															
	PHY2311	Analog Electronics	Basic	*		*	*		*	*			*	*	
	PHY2303	Mathematics (3)	Basic						*	*			*	*	
	UOBAB0503036	English language (2)	Optional									*	*	*	*
	PHY2401	Modern Physics (2)	Basic	*		*	*	*	*	*		*		*	
	PHY2402	Statistical Thermodynamic	Basic		*	*			*	*	*			*	*
	UOBAB0503016	Arabic Language	Basic										*	*	
	PHY2403	Digital Electronics	Basic	*	*	*		*	*	*			*		*
	UOBAB0503045	Computers (1)	Basic	*				*	*	*				*	*
	UOBAB0503046	Baath crimes of Iraq	Basic										*	*	*

Please tick the boxes corresponding to the individual program learning outcomes under evaluation.

MODULE DESCRIPTION FORM

وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Electricity**			**Module Delivery**	
Module Type	**C**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☒**Seminar**	
Module Code	**PHY1111**				
ECTS Credits	**8.00**				
SWL (hr/sem)	**150**				
Module Level	UGx11 UGI		**Semester of Delivery**	1	
Administering Department	PHY		**College**	COS	
Module Leader	Nassar A. Al-sawi		**e-mail**	Nassar.alisawi@uobabylon.edu.iq	
Module Leader's Acad. Title	Assistant Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	22/4/2026		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. Brief summary of all the contents that understood during semester 1. 1. Introducing some applications Electrical Charge and Current. 2. increase the range of solvable problems by developing standard techniques with a wide range of applicability. 3. Understanding the Law of Force between Charges and Forms of Coulomb's law. 4. Introducing the Application of Coulomb's law, Mutual potential energy of

	charges. Energy in simple harmonic motion 5. Increase the ability of problem solving by introducing new solution using Coulomb's law. 6. Understanding Capacitance and Electric Energy. 7. understand the mathematical structure of Electrostatic. 8. introduction to the basic principles and methods of Electromotive force, Resistance and conductance, Circuit elements.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks. 1. Recognize the problem related to Electrostatic Methods, The Law of Force between Charges, Capacitance and Electric Energy, Steady Electric Current and Problems. 2. Differentiate the mathematical concepts of the The Law of Force between Charges, Capacitance and Electric Energy. 3. Distinguish the ideas of Electrostatic. 4. Explain notations and concepts required for the solution of mathematical problem. 5. Identify the Mutual potential energy of charges. 6. The ability of students to solve Electrostatic Methods and Problems. 7. Comprehensive understanding of Steady Electric Current. 8. Satisfy all the applications related to Electromotive force, Resistance and conductance, Circuit elements.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1. **Electrical Charge and Current**: Electric Charge, Electric Current, The relation between electric charge and current, Units of current and charge. 2. Charge densities and the point charge, Current densities and the velocity of charges, Carriers of charge in good conductors. **3. The Law of Force between Charges:** Direction of the force and superposition, Dependence on magnitude and sign of charge, The inverse law. **4. Forms of Coulomb's law, Range of application of Coulomb's law, Application of Coulomb's law, Mutual potential energy of charges.** 5. **Electrical Field Strength and Potential** : Electric Filed strength, Calculation of fields due to charges, Charges in electric fields, Electric potential difference, Potential gradient and electric field . 6. Action of electric fields on particles, Conductors and insulators in electric fields. **7. Electrostatic Methods and Problems**: Gauss's law, Differential equations for electric field and potential, Spheres of Charge, Cylinders of Charge, Plans of charge, The electric dipole**.** The quadrupole and general arrangements of charge, The method of images. **8. Capacitance and Electric Energy:** Capacitance of conductor, Ideal capacitors, Combinations of capacitors, Capacitors in practice, Electric energy, Electrostatic measuring instruments. **9.** Applied electrostatics, Coefficient of potential, Capacitance and induction. **10. Steady Electric Current:** Electromotive force, Resistance and conductance, Circuit elements. **11.** Kirchhoff's laws and network terminology, Combinations of resistors, General steady-current networks. **12.** Thevenin's and Norton's theorems, Charge and discharge of a capacitor. **13.** Resistivity and conductivity, Resistors in practice, D.C. measurements.

	14. Solve Examples. **15. Examination.**

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students. The use of interactive presentations, the use of the interactive smart board, and the integration of modern teaching methods to reach the main goal, which is the realization, understanding, comprehension, analysis and synthesis of the academic content, in other words, the application of Bloom's scheme in learning.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	88	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**150**		

Module Evaluation
تقييم المادة الدراسية

As		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	6	10% (10)	5 and 10	LO #1, #2 and #7, #8
	Assignments	4	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #8
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري	
Week	**Material Covered**
Week 1	Electrical Charge and Current: Electric Charge, Electric Current, The relation between electric charge and current, Units of current and charge.
Week 2	**Charge densities and the point charge, Current densities and the velocity of charges, Carriers of charge in good conductors**
Week 3	**The Law of Force between Charges:** Direction of the force and superposition, Dependence on magnitude and sign of charge, The inverse law.
Week 4	**Forms of Coulomb's law, Range of application of Coulomb's law, Application of Coulomb's law, Mutual potential energy of charges. Energy in simple harmonic motion**
Week 5	**Electrical Field Strength and Potential**: Electric Filed strength, Calculation of fields due to charges, Charges in electric fields, Electric potential difference, Potential gradient and electric field
Week 6	**Action of electric fields on particles, Conductors and insulators in electric fields.**
Week 7	**Electrostatic Methods and Problems**: Gauss's law, Differential equations for electric field and potential, Spheres of Charge, Cylinders of Charge, Plans of charge, The electric dipole**.** The quadrupole and general arrangements of charge, The method of images
Week 8	**Capacitance and Electric Energy:** Capacitance of conductor, Ideal capacitors, Combinations of capacitors, Capacitors in practice, Electric energy,
Week 9	**Electrostatic measuring instruments, Applied electrostatics, Coefficient of potential, Capacitance and induction.**
Week 10	**Steady Electric Current:** Electromotive force, Resistance and conductance, Circuit elements.
Week 11	**Kirchhoff's laws and network terminology, Combinations of resistors, General steady-current networks.**
Week 12	**Thevenin's and Norton's theorems, Charge and discharge of a capacitor.**
Week 13	**Resistivity and conductivity, Resistors in practice, D.C. measurements.**
Week 14	**Applications and Solve Examples.**
Week 15	**Examination.**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	JAMES T. SHIPMAN AND CHARLES A. HIGGINS, Jr., AN INTRODUCTION TO Physical Science, Brooks/Cole, Cengage Learning, 2013	Yes
Recommended Texts	K. A. Tsokos,Physics for the IB Diploma, Cambridge University Press, Sixth Edition ,2014 - Amal Kumar Raychaudhuri ,Texts and Readings in Physical Sciences Volume 21, Classical Theory of Electricity and Magnetism A Course of Lectures, Hindustan Book Agency 2022. - John Dirk Walecka, Introduction to Electricity Magnetism, World Scientific Publishing Co. Pte. Ltd, 2019	yes

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks %**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

وصف المادة الدراسية

Module Information معلومات المادة الدراسية			
Module Title	**General Astronomy (1)**	**Module Delivery**	
Module Type	**C**	☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**PHY1205**		
ECTS Credits	**5.00**		
SWL (hr/sem)	**125**		
Module Level	UGI	**Semester of Delivery**	2
Administering Department	PHY	**College**	COS

Module Leader	Dr. Laith Talib Hadi Taj-Aldeen	**e-mail**	sci.layth.talib@uobabylon.edu.iq
Module Leader's Acad. Title	Assistant Professor	**Module Leader's Qualification**	Ph.D.
Module Tutor	Dr. Laith Talib Hadi Taj-Aldeen	**e-mail**	sci.layth.talib@uobabylon.edu.iq
Peer Reviewer Name	Name	**e-mail**	E-mail
Scientific Committee Approval Date	22/04/2026	**Version Number**	1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1- Give an idea on the history of astronomy in Arab and Islamic civilization. 2- The mechanism for monitoring and calculating some physical properties of astronomical constants. 3- Identifying the celestial bodies within the solar system. 4- Viewing different coordinate systems for astronomers. 5- Learning the life cycle of stars, and stellar system types. 6- Be able to distinguish the galaxy types and knowing their different physical properties. 7- Shedding light on the different theories for the of the existence for the current universe.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- List the various historical achievements in astronomy. 2- Calculating the magnitude and luminosity of various astronomical objects. 3- Recognizing the physical properties of the sun. 4- Describing the solar system planets in detail. 5- Explaining Kepler's laws. 6- Discussing the basic difference between meteorites, comets and shooting stars. 7- Listing and describing various observation systems. 8- Discussing the life cycle of a star and describing the Hertzsprung-Russell diagram. 9- Distinguishing between various types of galaxies and the AGN type. 10- Describing the theories on the universe existence. 11- Calculating the age of the universe. 12- Discussing life in the universe.
Indicative Contents المحتويات الإرشادية	<u>Chapters one and two</u> Astronomy in Mesopotamia, the Nile Valley and Arab Civilization, Astrolabe, Sundial, Same azimuth and height, Light and its properties, Light source, Stellar Magnitudes, Apparent Magnitudes, Absolute Magnitudes, Bolometric Magnitudes, Astronomical unit, Parallax, Parsec, Time units and mass used in astronomy. The solar system, Physical properties of the Sun and Its distance from Eart, The time the sunlight reaches the Earth, Diameter, Mass, Density rate, Solar atmospheres, Photosphere, Chromosphere, Corona, Axial motion of the sun, Sun spots, Filaments,

	Solar wind and Radiation, Solar energy and the solar constant, Methods for measuring the diameter, mass and temperature of the Sun's surface, Some physical properties of the moon. [28 hrs.] Chapter Three Planets of the solar system, The physical properties of the planets, Planetary diameter, planet mass, planet density, Gravity on the planet's surface, The period of rotation of the planet around itself, The planet's luminosity and temperature, Learn about the planets of the solar system, Mercury, Venus, Mars, Planetoids (Asteroids) belt, Jupiter, Saturn, Uranus, Neptune, Bode 's rule, Outer planetoids, Kuipers belt, Meteors and meteorites and Comets. [14 hrs.] Chapters Four to Five The geometry of the sphere and the spherical triangle, Geometry of the Celestial Sphere, Great and Small Circle, Spherical Angle, Zenith (Z), Nadir, Horizon, Celestial poles, Meridian circle, Celestial equator, Hour circles, Vertical circles, Spherical Triangle, The cosine formula for the sides, The cosine formula for the angles, The sine formula, The coordinate system on the celestial sphere, Horizon system, Equatorial system, Zodiac system, Galactic system, Zodiac and Ecliptic, Kepler's Lows, The law of orbits, The law of areas, The law of periods. Stars and Hertz sprung–Russell diagram, Main – sequence stars, Giant and Super giant stars, White dwarfs, Neutron stars, Eruptive Variable Stars, Pulsating Variable Stars, Rotating Variable Stars, Cataclysmic Variable Stars (Explosive and Nova-Like). [28 hrs.] Chapters six to seven Types of galaxies and their physical properties, Elliptical Galaxies, Lenticular Galaxies, Irregular Galaxies, Spiral Galaxies, Galaxy cluster, Clusters of galaxies, Supercluster, AGN Galaxies and the doughnut model. The Universe, Red Shift, Hubble's law, The diameter and age of the universe, Cosmology theories, The Big Bang Theory, Steady – State Theory, Life in the universe. [28 hrs.]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in this module is to widen the students' horizon regarding various astronomical phenomena like observations, how to achieve observations with different observational systems, and give basic headnotes on the physical properties of various celestial bodies such as the sun, planets, stars, moons, and galaxies. We will also address main astronomical units and relationships that are used in determining physical properties for these celestial bodies. This will be achieved through classes, interactive tutorials and by considering types of simple examples that may be interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	58	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	67	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**125**		

Module Evaluation
تقييم المادة الدراسية

As		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	5% (5)	4 and 11	LO #1, #2, #3 and #8, #9, #10
	Assignments	1	10% (10)	14	All
	Report	1	15% (15)	Continuous	All
Summative assessment	**Midterm Exam**	2hr	20% (20)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Introduction - Astronomy through history, Light, Stars the sores
Week 2	Luminosity, Magnitude in astronomy, Astronomical units
Week 3	The solar system, Physical properties of the Sun, The suns atmosphere, The axial motion of the sun.
Week 4	Solar spots, Radiation and solar winds, Solar energy and the solar constant, Methods used to measure the diameter, mass, and surface temperature of the sun.
Week 5	The physical properties for the planets, getting to know our planets.
Week 6	Outer asteroids, Kepler's planetary laws, Comets, Meteors, and Meteorites
Week 7	**Mid-term Exam**
Week 8	Geometry of the spheres and the spherical triangles, The coordinate systems, Horizon System, Zodiac system, Equatorial system, Galactic system
Week 9	The zodiac.
Week 10	Life cycle of a star, Measuring the physical properties of stars, Stars spectrum, Hertzsprung-Russell

	diagram
Week 11	Variable stars, Neutron stars, Binary and multiple star systems.
Week 12	Galaxy types and their physical properties, Galaxies clusters, The Milky Way galaxy
Week 13	External galaxies, AGN galaxies.
Week 14	Theories on the universe creation, The expand Universe.
Week 15	The diameter and age of the Universe, Life in the universe.
Week 16	**Preparatory week before the final Exam.**

Delivery Plan (Weekly Lab. Syllabus)
المنهاج الاسبوعي للمختبر

Week	Material Covered
Week 1	No lab required
Week 2	No lab required
Week 3	No lab required
Week 4	No lab required
Week 5	No lab required
Week 6	No lab required
Week 7	No lab required

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Extragalactic Astronomy and Cosmology an Introduction, Peter Schneider, Springer-Verlag Berlin Heidelberg 2006.	Yes
Recommended Texts	1- Galaxies in the Universe: An Introduction, Linda S. Sparke, John S. Gallagher III, Sparke, and J. Gallagher 2007. 2- Lecture notes of Dr. Vivienne Wild, St-Andrews University, 2015-2018. 3- Lecture notes of Dr. Simon Goodwin, Sheffield University. 4- Lecture nots of Dr. Ben Maughan, Cardiff University, 2015.	No
Websites	Wikipedia.	

Grading Scheme
مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria

Fail Group (0 – 49)	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Computer(1)**			**Module Delivery**	
Module Type	**S**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**UOBAB0503014**				
ECTS Credits	**3.00**				
SWL (hr/sem)	**125**				
Module Level	UGx11 UGI		**Semester of Delivery**	1	
Administering Department	PHY		**College**	COS	
Module Leader	Ghaidaa A.Hafedh Jaber		**e-mail**	Sci.ghaidaa.abdul-hafidh@uobabylon.edu.iq	
Module Leader's Acad. Title	lecturer		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	22/04/2026		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. To develop problem solving skills and understanding of computer through the applications of this techniques. 2. To understand the deals of this device and the hardware. 3. This course deals with the basic concept of computer. 4. This is the basic subject for all programs setting in computer. 5. To understand most of the computer. 6. To understand the software program.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks. 1. The course includes a study of some Office applications. 2. How can use Word and PowerPoint. 3. Identification of most of the capabilities provided by these applications. 4. That the student can write reports or practical research. 5. present the research in a consistent manner. 6. Deal with setting programs.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Part A – fundamental of computer</u> Parts of computer, hardware parts, contents of the case, input devices, output devices . [10 hrs] Protect of computer, malware, viruses, security . [10 hrs] Operating systems, Windows system, windows view, create a folder . [10 hrs] Revision. [10 hrs] <u>Part B – Microsoft office</u> Definition of Microsoft office, the view of Microsoft word, ribbons, print the sheet, save the files. [20 hrs] View of the power point, the slides, the moving, transition, present . [20 hrs] View of the excel, the functions, deal of the cells, print the sheets. [20 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	58	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem)	67	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4

الحمل الدراسي غير المنتظم للطالب خلال الفصل			
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**125**		

Module Evaluation
تقييم المادة الدراسية

As		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	Midterm Exam	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Introduction
Week 2	Basics of computer
Week 3	Uses of computer
Week 4	Operating systems
Week 5	The view of Microsoft word
Week 6	Home page
Week 7	Insert page
Week 8	Print the file
Week 9	Microsoft power point
Week 10	The interface
Week 11	Design the slides
Week 12	Presentation
Week 13	Excel
Week 14	The functions in excel
Week 15	Tables in excel

Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus)
المنهاج الاسبوعي للمختبر

Week	Material Covered
Week 1	Lab 1: input devices
Week 2	Lab 2: output devices
Week 3	Lab 3: create a folder and save it
Week 4	Lab 4: the view of the word
Week 5	Lab 5: the view of power point
Week 6	Lab 6: the view of excel
Week 7	Lab 7: print the files

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Basics of computer and its office applications / part one Mr. Dr. Ghassan Hamid Abdel Majeed + M.D. Ziyad Mohammed Abboud	Yes
Recommended Texts	MICROSOFT WORD 2016 STEP-BY-STEP GUIDE A MC-NPL Computer Lab Lesson Plan	No
Websites	https://www.tutorialsmate.com/2020/04/computer-fundamentals-tutorial.html	

Grading Scheme
مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Mathematics (1)			**Module Delivery**	
Module Type	S			☒ Theory ☒ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Code	PHY1113				
ECTS Credits	7.00				
SWL (hr/sem)	125				
Module Level	UGI		**Semester of Delivery**	1	
Administering Department	PHY		**College**	COS	
Module Leader	Fouad Hamza Abd		**e-mail**	sci.fouad.hamzah@uobabylon.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	22/04/2026		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. The student understands the basic concepts of mathematics 2. Teaching the student, the rules he needs to solve a physical problem 3. Enable the student to analyze some laboratory results 4. Use mathematical software packages as a powerful tutoring tool. 5. Students will be prepared to use mathematics and related technology in their careers or their graduate study.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. They are mastering the basic features of Mathematics (precision, abstraction, and systematic thinking). 2. Proper use of mathematical software packages either for helping to solve problems or as a powerful means of visualization 3. Upon completing this module, students are expected to have an introductory

	knowledge of mathematics ready for Maths II.
Indicative Contents المحتويات الإرشادية	1. Real Numbers. 2. Real Functions. 3. Limits and continuity. 4. Derivatives and their applications. 5. Integration. 6. Applications of definite integrals. 7. Techniques of integration.

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

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

Student Workload (SWL)
الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	58	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	67	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**125**		

Module Evaluation
تقييم المادة الدراسية

As		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	4	4% (4)	5 and 12	LO #1, #2, #3 and #10, #11
	Assignments due	3	3% (3)	3 and 13	LO #3, #4 and #6, #7 and #11, #12
	Report	1	3% (3)	13	LO #5, #8 and #14
Summative assessment	**Midterm Exam**	2hr/2	30% (30)	7 and 15	LO #1 - #6 and #7-#13
	Final Exam	3hr	60% (60)	13	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Real Numbers - Intervals – Inequalities - Absolute value- Limits and continuity.
Week 2	Real Functions-- Definition - Domain and Range.
Week 3	Derivative of functions - Derivative Rules- Chain rule
Week 4	Trigonometric functions and it's inverse.
Week 5	Logarithm function and Exponential function.
Week 6	L'Hopital's rule.
Week 7	Mid-term Exam 1
Week 8	Hyperbolic functions.
Week 9	Integration- Direct integrals - Trigonometric integrals.
Week 10	Definite integral.
Week 11	Techniques of Integration - Integration by parts.
Week 12	Integration by the mothed of partial fractions.
Week 13	Using integral tables
Week 14	Applications of definite integral.
Week 15	Mid-term Exam 2
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	*Thomas' Calculus*	Yes
Recommended Texts	Calculus and analytic geometry _ Thomas	No
Websites	https://www.whitman.edu/mathematics/calculus_online/section08.06.html	

Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded

(0 – 49)	**F –** Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information
معلومات المادة الدراسية

Module Title	**Magnetism**		**Module Delivery**	
Module Type	**C**		☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☒**Seminar**	
Module Code	**PHY1202**			
ECTS Credits	**6.00**			
SWL (hr/sem)	**150**			
Module Level	UGx1 UGI	**Semester of Delivery**	2	
Administering Department	PHY	**College**	COS	
Module Leader	Nassar A. Al-sawi	**e-mail**	Nassar.alisawi@uobabylon.edu.iq	
Module Leader's Acad. Title	Assistant Professor	**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)	**e-mail**	E-mail	
Peer Reviewer Name	Name	**e-mail**	E-mail	
Scientific Committee Approval Date	5/6/2023	**Version Number**	1.0	

Relation with other Modules
العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	**Semester**	1
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	9. Brief summary of all the contents that understood during semester 1.

	2. Introducing some applications Magnetic Field and Magnetic Dipoles: Magnetic forces and couples, Magnetic dipoles and magnetic moment, Magnetic flux density. 10. increase the range of solvable problems by developing standard techniques with a wide range of applicability. 11. Understanding the Magnetic potential and magnetomotive force, Magnetic flux, Monopoles and New subject: Forces Between Steady Currents: Magnetic fields due to currents, Currents in Magnetic fields, Forces between currents 12. Introducing the Application of Electromagnetic induction, Induced currents and charges, Motional e.m.f. 13. Increase the ability of problem solving by introducing new solution. 14. Understanding Motion of Charged Particles in Electric and Magnetic Fields. 15. understand the mathematical structure of Magnetic Fields. 16. introduction to the basic principles and methods of Electromotive force, and Magnetic Fields.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks. 9. Recognize the problem related to Self-Inductance, Mutual inductance, Magnetic energy, Inductors in practice and New subject: Varying Current in Linear Networks. 10. Differentiate the mathematical concepts of the The Law of Force between Charges, Capacitance and Electric Energy. 11. Distinguish the ideas of LCR circuits, Coupled circuits and the ideal transformer, Transformers in Practice, Filters and attenuators, Transmission lines, A.C measurements. 12. Explain notations and concepts required for the solution of mathematical problem. 13. Identify the Mutual Volume currents in conductors, Mobility and diffusion of curriers, Metallic conduction. 14. The ability of students to solve Electrostatic Methods and Problems. 15. Comprehensive understanding of Conduction: Volume currents in conductors, Mobility and diffusion of curriers, Metallic conduction. 16. Satisfy all the applications related to The magnetic Circuits and the production of magnetic fields, Magnetic poles, Measurement of magnetic permeability and susceptibility.
Indicative Contents المحتويات الإرشادية	**Magnetic Field and Magnetic Dipoles**: Magnetic forces and couples, Magnetic dipoles and magnetic moment, Magnetic flux density.
	Magnetic potential and magnetomotive force, Magnetic flux, Monopoles and New subject: **Forces Between Steady Currents:** Magnetic fields due to currents, Currents in Magnetic fields, Forces between currents
	Moving charges, General laws for steady magnetic fields and New subject: **Electromagnetic Induction and Magnetic Energy:** Electromagnetic induction, Induced currents and charges, Motional e.m.f.
	Self-Inductance, Mutual inductance, Magnetic energy, Inductors in practice and New subject: **Varying Current in Linear Networks:** Circuit elements, Transients in a series LCR circuit, Transients in coupled circuits, General A.C. theory, A.C. power and R.M.C. values, Resonance in series and parallel.
	LCR circuits, Coupled circuits and the ideal transformer, Transformers in Practice, Filters and attenuators, Transmission lines, A.C measurements.
	Motion of Charged Particles in Electric and Magnetic Fields: Steady Electric field, Steady magnetic fields, Steady electric and magnetic fields, Time-Varying field and the acceleration of Particles.
	Magnetic dipoles in magnetic fields, Resonances.
	Conduction: Volume currents in conductors, Mobility and diffusion of curriers, Metallic conduction.

	The Hall effect, The band theory of conduction in solids, Conduction in liquids and gases.
	Dielectric Materials: Relative Permittivity, Polarization and electric susceptibility.
	General electrostatic laws and electric displacements, Electric energy in the presence of dielectrics**.**
	Magnetic Materials: Relative permeability, Magnetization, General, magnetic laws and magnetic field strength**.**
	Boundaries and finite media, Magnetic energy and force, Ferromagnetic materials
	The magnetic Circuits and the production of magnetic fields, Magnetic poles, Measurement of magnetic permeability and susceptibility.

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students. The use of interactive presentations, the use of the interactive smart board, and the integration of modern teaching methods to reach the main goal, which is the realization, understanding, comprehension, analysis and synthesis of the academic content, in other words, the application of Bloom's scheme in learning.

Student Workload (SWL)
الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	88	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**150**		

Module Evaluation
تقييم المادة الدراسية

As		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	6	10% (10)	5 and 10	LO #1, #2 and #7, #8
	Assignments	4	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8
Summative	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #8

assessment	**Final Exam**	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	**Magnetic Field and Magnetic Dipoles**: Magnetic forces and couples, Magnetic dipoles and magnetic moment, Magnetic flux density
Week 2	Magnetic potential and magnetomotive force, Magnetic flux, Monopoles and New subject: **Forces Between Steady Currents:** Magnetic fields due to currents, Currents in Magnetic fields, Forces between currents
Week 3	Moving charges, General laws for steady magnetic fields and New subject: **Electromagnetic Induction and Magnetic Energy:** Electromagnetic induction, Induced currents and charges, Motional e.m.f.
Week 4	**Self-Inductance, Mutual inductance, Magnetic energy, Inductors in practice** and New subject: **Varying Current in Linear Networks:** Circuit elements, Transients in a series LCR circuit, Transients in coupled circuits, General A.C. theory, A.C. power and R.M.C. values, Resonance in series and parallel.
Week 5	LCR circuits, Coupled circuits and the ideal transformer, Transformers in Practice, Filters and attenuators, Transmission lines, A.C measurements.
Week 6	**Motion of Charged Particles in Electric and Magnetic Fields:** Steady Electric field, Steady magnetic fields, Steady electric and magnetic fields, Time-Varying field and the acceleration of Particles.
Week 7	Magnetic dipoles in magnetic fields, Resonances.
Week 8	**Conduction:** Volume currents in conductors, Mobility and diffusion of curriers, Metallic conduction.
Week 9	The Hall effect, The band theory of conduction in solids, Conduction in liquids and gases.
Week 10	**Dielectric Materials:** Relative Permittivity, Polarization and electric susceptibility.
Week 11	General electrostatic laws and electric displacements, Electric energy in the presence of dielectrics**.**
Week 12	**Magnetic Materials:** Relative permeability, Magnetization, General, magnetic laws and magnetic field strength**.**
Week 13	Boundaries and finite media, Magnetic energy and force, Ferromagnetic materials
Week 14	The magnetic Circuits and the production of magnetic fields, Magnetic poles, Measurement of magnetic permeability and susceptibility.
Week 15	**Examination.**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	MUNIR H. NAYFEH and MORTON K. BRUSSEL, Electricity and Magnetism, JOHN WILEY & Sons, Inc, 1985	Yes
Recommended Texts	- _K K Tewari , Electricity and Magnetism, S Chand and company LTD, 2011 - Amal Kumar Raychaudhuri ,Texts and Readings in Physical	yes

	Sciences Volume 21, Classical Theory of Electricity and Magnetism A Course of Lectures, Hindustan Book Agency 2022. - John Dirk Walecka, Introduction to Electricity Magnetism, World Scientific Publishing Co. Pte. Ltd, 2019	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks %**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Mathematics 2			**Module Delivery**	
Module Type	**S**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**PHY1213**				
ECTS Credits	**5.00**				
SWL (hr/sem)	125				
Module Level	UGI		**Semester of Delivery**	2	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Fouad Hamza Abd		**e-mail**	sci.fouad.hamzah@uobabylon.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	

Peer Reviewer Name	Name	e-mail	E-mail
Scientific Committee Approval Date	22/4/2026	Version Number	1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	6. The student understands the basic concepts of mathematics 7. Teaching the student, the rules he needs to solve a physical problem 8. Enable the student to analyze some laboratory results 9. Use mathematical software packages as a powerful tutoring tool. 10. Students will be prepared to use mathematics and related technology in their careers or their graduate study.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	4. They are mastering the basic features of Mathematics (precision, abstraction, and systematic thinking). 5. Proper use of mathematical software packages either for helping to solve problems or as a powerful means of visualization 6. Upon completing this module, students are expected to have an introductory knowledge of mathematics ready for Maths 3.
Indicative Contents المحتويات الإرشادية	8. Partial Derivatives and it's Applications. 9. Multiple Integrals. 10. Polar Coordinates. 11. Gamma and Beta Functions. 12. Sequences and Series. 13. Taylor-Maclaurin Series. 14. Applications of Taylor-Maclaurin Series.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The primary strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ أسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	58	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4

Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	67	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**125**		

Module Evaluation
تقييم المادة الدراسية

As		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	4	4% (4)	5 and 12	LO #1, #2, #3 and #10, #11
	Assignments due	3	3% (3)	3 and 13	LO #3, #4 and #6, #7 and #11, #12
	Report	1	3% (3)	13	LO #5, #8 and #14
Summative assessment	**Midterm Exam**	2hr/2	30% (30)	7 and 15	LO #1 - #6 and #7-#13
	Final Exam	3hr	60% (60)	13	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Partial Derivatives - Second Order Partial Derivatives.
Week 2	Chain Rule for Partial Derivatives - Laplace's, Wave and Heat Equations.
Week 3	Jacobian and Hessian Matrices.
Week 4	Gradient and Laplace Operator of a Scalar Field.
Week 5	Divergence and the Curl of a Vector Field.
Week 6	Double Integrals - Triple Integrals.
Week 7	Mid-term Exam 1
Week 8	Polar Coordinates
Week 9	Gamma and Beta Functions.
Week 10	Sequences.
Week 11	Infinite Series.
Week 12	Tests for converges of series.
Week 13	Taylor-Maclaurin Series.
Week 14	Applications of Taylor - Maclaurin Polynomials.

Week 15	Mid-term Exam 2
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	*Thomas' Calculus*	Yes
Recommended Texts	Calculus and analytic geometry _ Thomas	No
Websites	https://www.whitman.edu/mathematics/calculus_online/section08.06.html	

Grading Scheme
مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**English Language (1)**			**Module Delivery**	
Module Type	**B**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**UOBAB0503026**				
ECTS Credits	**2.00**				
SWL (hr/sem)	**75**				
Module Level	UGx11 UGI		**Semester of Delivery**	2	
Administering Department	PHY		**College**	COS	
Module Leader	Ameerah Abo alsawd Hammadi Mahjaj Al – Sadooni		**e-mail**	sci.ameera.k@ uobabylon.edu.iq	
Module Leader's Acad. Title	Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	22/04/2026		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. Helping students to reach the beginner level in English. 2. The student will learn basic vocabulary that helps in dealing and communicating the idea with others. 3. In this course, students will learn the correct pronunciation of vocabulary similar to native speakers. 4. The student learns to read the time, describe the heading, and how to deal with different situations. 5. To understand the numbers and how to write a letter .
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks. 1. Correct pronunciation of important vocabulary in daily life. 2. The student introduces himself to others and communicates with others. 3. Describes a specific address or location. 4. Learn to speak the right times. 5. Up to beginner level of English. 6. Make questions.
Indicative Contents المحتويات الإرشادية	Introduce yourself: to introduce yourself first thing you should state your name and age then state if you are a student or graduate and last some key points that help you to leave a good first impression. [15 hrs] Learn about pronouns and how to use the auxiliary "is" also the daily expressions like good morning, excuse me, how are you? ,do you need help?, good luck, can you help me?. Also learn about family members name (Father, Mother, Brother, Sister, Son, Daughter, Uncle Aunt, Grandmother and grandfather)[15 hrs] Learn negation and affirmation. Also learn how create questions using the Wh-questions, yes-no questions and alternative questions. Practice reading and telling time, learn how to reach an address and give directions. [10 hrs] Learn and practice writing letters, business card and postcards. Also developing listening skills. Learn about different culture food and traditions. [15 hrs] Learn how and when to use the auxiliary verb "have". Also learn how to use past simple and identify it. [6 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	44	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	31	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**75**		

Module Evaluation تقييم المادة الدراسية					
As		**Time/Number**	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10

Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Ch-1 Hello
Week 2	Ch-2 Your world
Week 3	CH-3 All about you
Week 4	Listening practice
Week 5	Ch-4 Family and friend part -1
Week 6	Ch-4 Family and friend part -2
Week 7	Exam
Week 8	Ch-5 and Ch-6 The way I live and Every day
Week 9	Listening practice
Week 10	Ch-7 and Ch-8 My favorites and Where I live
Week 11	Ch-9 and ch-10 Times past and We had a great time
Week 12	Ch-11 and Ch-12 I can do that and Please and thank you
Week 13	Listening practice
Week 14	Ch-13 Here and now
Week 15	Ch-14 It`s time to go
Week 16	Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر	
Week	**Material Covered**
Week 1	NO LAB.
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Headway Beginner Student's Book John and Liz Soars fourth edition	No
Recommended Texts		No
Websites		

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks %**	**Definition**
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria

Fail Group (0 – 49)	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information

معلومات المادة الدراسية

Module Title	**Modern Physics (1)**	**Module Delivery**	
Module Type	**C**	☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**PHY2312**		
ECTS Credits	**6.00**		
SWL (hr/sem)	**150**		
Module Level	UGx11 UGII	**Semester of Delivery**	3
Administering Department	PHY.	**College**	COS
Module Leader	Musa Kadhim Mohsin	**e-mail**	Sci. musa.kadhim@uobabylon.idu.
Module Leader's Acad. Title	Assistant Professor	**Module Leader's Qualification**	Ph.D.
Module Tutor	Name (if available)	**e-mail**	E-mail
Peer Reviewer Name	Name	**e-mail**	E-mail
Scientific Committee Approval Date	22/04/2026	**Version Number**	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. To comment on the and discuss the basics of Special theory of relativity and the importance periodicity. 2.Students will have the opportunity to apply their knowledge of Classical and Quantum Mechanics to real systems such as electrons and atoms. 3. Students will be able to follow the development of the phenomenon of atomic from both experimental and theoretical viewpoints. 4. To discuss the principles of Classical and Quantum Physics. 5. Improve the skills of students to real with the apparatus needed to investigate the properties of atoms. 6.To improve the experimental skills and theoretical knowledge necessary to work in research, education fields. 7. Explain the concept of the particles and waves. 8. To discuss the behavior of electrons in atoms. 9. To comment on and to discuss the behavior of light as a waves. 10. To investigate the behavior of light as particles. 11. To defined and studying the diffraction, interference, and polarization properties. 12. Describe the application of quantum principles in studying the atomically properties of atoms. 13. To discuss and measure the wavelength of particles. 14. Develop the comprehension of students to the physics of atomic
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks. 1. Recognize how electrons works in atoms. 2. List the various terms associated with modern physics. 3. Summarize what is meant by a basic atom. 4. Discuss the reaction and involvement of atoms in nucleus. 5. Define hydrogen atom. 6. Discuss the behavior of light as a waves. 7. Discuss the behavior the particles as waves..
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Modern Physics provides the basis for the most important technological advances of the 20th century and 21st century. It also provides a wide range of opportunities to 'see' the effects of Classical Physics and Quantum Physics in atoms. The purpose of this course is to provide an introduction to the relative and quantum theory in order to enable to understands the atomic physics. We will focus upon the fundamental unifying concepts important in understanding the properties of nuclei and electrons in atoms.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time

	refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	88	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	60	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**150**		

Module Evaluation
تقييم المادة الدراسية

As		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	**Special theory of relativity:** Introduction - Introduction to Special theory of relativity, inertia systems .
Week 2	Galilean transformation, Lorentz transformation, the inverse Lorentz transformation, length contraction.
Week 3	Time dilation, velocities addition, relativity of masses, relative momentum, relation of mass and energy .

Week 4	**Properties of waves:** Introduction, the photoelectric effect, the quantum theory of light.
Week 5	The Compton effect, the pair production, absorption coefficient.
Week 6	**Properties of particles**: De Broglie hypothesis
Week 7	De Broglie wave velocity, group velocities.
Week 8	Diffraction of particles, the uncertainty principle,
Week 9	Applications of the uncertainty principle
Week 10	**The atomic structure:** Atomic models, electronic orbits.
Week 11	Atomic spectra, Bohr atom,
Week 12	Energy levels and spectra, correspondence principle.
Week 13	**Quantum Mechanics:** Introduction in quantum mechanics.
Week 14	The wave equation
Week 15	Time dependent Schrödinger equation(TDSE).

Delivery Plan (Weekly Lab. Syllabus)
المنهاج الاسبوعي للمختبر

Week	Material Covered
Week 1	Lab 1:
Week 2	Lab 2:
Week 3	Lab 3:
Week 4	Lab 4:
Week 5	Lab 5:
Week 6	Lab 6:
Week 7	Lab 7:

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Arthur Beiser, Concepts of Modern Physics, Sixth Edition, McGraw-Hill Companies, Inc., 2003.	No
Recommended Texts	G.Aruldhas and P. Rajagopal, Modern Physics, prentice-Hall of India Private Limited, New Delhi, 2005.	Yes
Websites	Lecturers, Internet.	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks %**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Heat and Thermodynamic**			**Module Delivery**	
Module Type	**C**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**PHY2315**				
ECTS Credits	**6.00**				
SWL (hr/sem)	**150**				
Module Level	UGx11 UGII		**Semester of Delivery**	3	
Administering Department	PHY		**College**	COS	
Module Leader	Mohsin Kadhim Abed Al-Khaykanee		**e-mail**	Sci.m.al-khaykanee@uobabylon.edu.iq	
Module Leader's Acad. Title	Assist. Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	22/04/2026		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	This course deals with the fundamentals of Thermodynamics including: 1. Thermodynamic systems and properties. 2. Study energy conversion in different forms. 3. Relationships among the thermos-physical properties. 4. Study the entropy of a system. 5. The laws of thermodynamics and applications of these basic laws in thermodynamic systems. 6. To improve the efficiency of a process for the transformation between energy and work. 7. This course will provide the essential tools required to study thermodynamic systems in Applied Thermodynamics.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks. 1. Explain fundamental concepts relevant to thermodynamics. 2. Explain the concepts of work, power, and heat in thermodynamics; determine work and heat sign conventions; determine work involved with moving boundary systems (graphical and analytical methods). 3. Explain the first law of thermodynamics for a closed system. 4. Perform energy analysis of heat engine, refrigeration and heat pump thermodynamic cycles. 5. Determine thermodynamic properties of pure substances. 6. Apply the first law of thermodynamics for a control volume, including with turbines, compressors, nozzles, diffusers, heat exchangers, and throttling devices. 7. Explain the second law of thermodynamics, including why it is necessary, how it is defined (Kelvin-Planck and Clausius), the nature of irreversibility, and the Carnot cycle. 8. Explain the concept of entropy, including the Clausius Inequality, using thermodynamic tables, setting up entropy balances, and calculating isentropic efficiency of pumps, compressors, turbines, and heat exchangers.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Part A – Thermodynamics1</u> Thermal Sciences, Dimensions and Units, Basic definition of Thermodynamics, Thermodynamic Systems, Properties of a System, Thermodynamic equilibrium, Thermodynamic variables, Processes and Cycles, The Zeroth and first Laws of Thermodynamics, The Steady & Non-Flow Energy Equations. [15 hrs]

	Ideal Gas– Boyle's Law, Charles's Law. The characteristic equation of a perfect gas, Joule's Law, The specific heat capacities of gas, Relation between specific heat (C_p and C_v), Reversible and irreversible processes, Relation between P, V and T in adiabatic process [10 hrs] The first law of thermodynamics - The Energy Equation The Definition of Work and Heat, Work Done at the Moving Boundary of a Simple Compressible System, Heat Transfer Modes, Internal Energy—a Thermodynamic Property, Problem Analysis and Solution Technique, The Thermodynamic Property Enthalpy, The Constant-Volume and Constant-Pressure Specific Heats, The Internal Energy, Enthalpy, and Specific Heat of Ideal Gases, General Systems that Involve Work, Conservation of Mass. [10 hrs] Revision problem classes [6 hrs] **Part B – Thermodynamics2** Fundamentals **Second Law of Thermodynamics**, Heat reservoir, The Heat engine, Heat pump and refrigerator, Statements for Second law of thermodynamics, Equivalence of Kelvin-Planck and Clausius statements of Second law of thermodynamics, Reversible and irreversible processes, Carnot cycle and Carnot engine, Carnot theorem and its corollaries, Thermodynamic temperature scale. [15 hrs] **Entropy** – Clausius inequality, Entropy – A property of system. Principle of entropy increase, Entropy change during different thermodynamic processes, Entropy and its relevance, Thermodynamic property relationship, Third law of thermodynamics. [15 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	88	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4

Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150

Module Evaluation
تقييم المادة الدراسية

As		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	Midterm Exam	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Introduction - Basic Concepts of Thermodynamics
Week 2	Thermodynamic Systems, Properties of a System, Thermodynamic equilibrium
Week 3	Processes and Cycles, Forms of energy and reversibility, The Zeroth and first Laws of Thermodynamics
Week 4	The Steady & Non-Flow Energy Equations, Ideal Gas, Boyle's Law
Week 5	Charles's Law, The characteristic equation of a perfect gas, Joule's Law
Week 6	The specific heat capacities of gas, Relation between specific heat (C_p and C_v)
Week 7	Mid-term Exam
Week 8	Reversible and irreversible processes, Relation between P, V and T in adiabatic process
Week 9	The first law of thermodynamics, The Energy Equation, The Definition of Work and Heat
Week 10	Work Done at the Moving Boundary of a Simple Compressible System, Heat Transfer Modes
Week 11	Internal Energy-a Thermodynamic Property, Problem Analysis and Solution Technique
Week 12	The Thermodynamic Property Enthalpy
Week 13	The Internal Energy, Enthalpy, and Specific Heat of Ideal Gases
Week 14	General Systems that Involve Work, Conservation of Mass
Week 15	The Constant-Volume and Constant-Pressure Specific Heats
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week	**Material Covered**
Week 1	Lab 1: Measuring the linear expansion of solids as a function of temperature
Week 2	Lab 2: Determining the specific latent heat of ice
Week 3	Lab 3: The mewasurment of the e.m.f of a thermocouple
Week 4	Lab 4: Determining the heating Power of an ohmic load in an AC circuit as a function of the applied voltage
Week 5	Lab 5: Converting electrical energy into heat Measuring with a voltmeter and an ammeter
Week 6	Lab 6: Determining the specific heat of solids
Week 7	Lab 7: Investigation the function of the expansion valve of the heat pump
Week 8	Lab8: Determination of the apparent expansions coefficient of liquid by using the density bottle

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Temperature and thermodynamics, Muhyiddin Abbas and Hussein Al-Sayes / Al-Mustansiriya University.	Yes
Recommended Texts	Applied Thermodynamics, , Onkar Singh. (2003). New Age International.	No
Websites	https://www.khanacademy.org/science/physics/thermodynamics	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks %**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

نموذج وصف المادة الدراسية

Module Information
معلومات المادة الدراسية

Module Title	**Analytical mechanics (1)**	**Module Delivery**	
Module Type	**C**	☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	**PHY2304**		
ECTS Credits	**5.00**		
SWL (hr/sem)	**125**		

Module Level	UGx11 UGII	**Semester of Delivery**	3
Administering Department	PHY	**College**	COS
Module Leader	Hikmat Adnan Jawad	**e-mail**	Sci.hikmat.adnan@uobabylon.edu.iq
Module Leader's Acad. Title	Professor	**Module Leader's Qualification**	Ph.D.
Module Tutor	Name (if available)	**e-mail**	E-mail
Peer Reviewer Name	Name	**e-mail**	E-mail
Scientific Committee Approval Date	22/04/2026	**Version Number**	1.0

Relation with other Modules
العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	17. Introducing students to the motion of dynamical systems which is typically described in terms of two basic quantities: scalars and vectors. 18. Understanding the Isaac Newton's laws of motion and derivation of the 4 equations of linear and rotational motion 19. Investigating the motion with straight line with constant acceleration. 20. Understanding the circular motion (uniform and non-uniform) 21. Introducing the projectile motion and understanding the problem solving strategy. 22. Explain center of mass and linear momentum of a system 23. Rotation of a rigid body about an arbitrary axis: moments and products of inertia-angular momentum and kinetic energy. 24. Understanding the work-energy theorem.
Module Learning	Important: Write at least 6 Learning Outcomes, better to be equal to the

Outcomes مخرجات التعلم للمادة الدراسية	number of study weeks. 17. Distinguish mathematical concepts relevant to Conservative and non-conservative groups. 18. Investigate the amount of motion in generalized coordinates. 19. Identify background science, features and structure of mathematical problem relative to analytical mechanics. 20. Identify the basic principle of power, linear motion and angular momentum. 21. Recognize the problem related to total energy, Lagrange's method: mechanical systems, degrees of freedom, generalized coordinates. 22. Differentiate the mathematical concepts of the Lagrangian and variational principles.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1. Introduction to vectors 2. Addition and Subtraction of Vectors 3. Vector components 4. Some other properties of Vectors 5. The unit vector 6. Vectors Products 7. Scalar Product 8. Cross Product 9. Triple Products 10. Derivative of a Vector 11. Linear Motion and Newton Laws 12. Motion along Straight Line 13. Motion with Constant Acceleration 14. Free Body Falling 15. Position and Velocity via Integration 16. Position, Velocity and Acceleration Vectors 17. Projectile Motion 18. Circular Motion 19. Uniform Circular Motion 20. Non-uniform Circular Motion 21. Newton's Laws of Motions 22. Work, Energy and Power 23. Force 24. Work 25. Work-Energy Theorem 26. Work-Energy theorem with varying Force 27. Power 28. Gravitational Potential Energy 29. Elastic Potential Energy 30. Law of Conservation of Energy 31. Force and Potential Energy 32. Momentum 33. Conservation of Momentum 34. Centre of Mass 35. Rotational motion 36. Angular Velocity and Acceleration 37. Motion with Constant Angular Acceleration 38. Linear and Angular Kinematics 39. Energy in Rotational Motion

	40. Torque 41. Work and Power in Rotational Motion 42. Angular Momentum 43. Conservation of Angular Momentum **44.** Gyroscope and Precession

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	58	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	67	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**125**		

Module Evaluation
تقييم المادة الدراسية

As		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5 and 10	LO #1, #2 and #5, #6
	Assignments	2	10% (10)	2 and 12	LO #3, #4
	Projects	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #4, #5 and #6
Summative assessment	Midterm Exam	2hr	10% (10)	7	LO #1 - #6
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري	
Week	**Material Covered**
Week 1	Addition and Subtraction of Vectors Vector components Some other properties of Vectors The unit vector
Week 2	Vectors Products Scalar Product Cross Product Triple Products Derivative of a Vector
Week 3	Motion along Straight Line Motion with Constant Acceleration Free Body Falling
Week 4	Position and Velocity via Integration Position, Velocity and Acceleration Vectors Projectile Motion
Week 5	Circular Motion Uniform Circular Motion Non-uniform Circular Motion Newton's Laws of Motions
Week 6	Force Work Work-Energy Theorem
Week 7	Work-Energy Theorem Work-Energy theorem with varying Force Power
Week 8	Gravitational Potential Energy Elastic Potential Energy
Week 9	Law of Conservation of Energy Force and Potential Energy
Week 10	Momentum Conservation of Momentum Centre of Mass
Week 11	Rotational motion Angular Velocity and Acceleration
Week 12	Motion with Constant Angular Acceleration Linear and Angular Kinematics
Week 13	Energy in Rotational Motion Torque
Week 14	Work and Power in Rotational Motion Angular Momentum
Week 15	Conservation of Angular Momentum Gyroscope and Precession
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Hand, Louis N., and Janet D. Finch. *Analytical mechanics*. Cambridge University Press, 1998.	Yes
Recommended Texts	Lurie, Anatolii Isakovich. *Analytical mechanics*. Springer Science & Business Media, 2013.	No

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks %**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Analog Electronics**			**Module Delivery**	
Module Type	**C**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**PHY2311**				
ECTS Credits	**6.00**				
SWL (hr/sem)	**150**				
Module Level	UGx11 UGII		**Semester of Delivery**	3	
Administering Department	PHY		**College**	COS	
Module Leader	Ali madlool neamh sabar al- jawdah		**e-mail**	Sci.ali.sabor@ uobabylon.idu.iq	
Module Leader's Acad. Title	Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	

Peer Reviewer Name	Name	e-mail	E-mail
Scientific Committee Approval Date	22/4/2026	Version Number	1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. To introduce semiconductor, conductor and insulator materials and their properties. 2. To develop an understanding of diode and transistor work principle. 3. Produce designs for simple analogue circuits. 4. Recognize, interpret, analyze and design electronic circuit's amplifiers, feedback systems, oscillators and power supplies. 5. Recognize and use laboratory equipment and software simulation tools for the analysis of analog electronic circuits 6. Recognize and appreciate the practical applications of analog circuits.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks. 1. Be able to demonstrate understanding of the properties of electrons in conductors and semiconductor materials. 2. Be able to design simple analogue circuits using resistors, capacitors, inductors, diodes and operational amplifiers. 3. Be able to explain the operation and limitations of basic operational amplifier circuits. 4. Be able to build and test the performance of a range of circuit building blocks comparing the results with theory. 5. Illustrate working principle of different electronic circuit and their application in real life. 6. Choose proper semiconductor devices depending upon application considering economic and technology up-gradation. 7. Recognize different signal processing circuit and the use in industrial, real life, modern control system application. 8. . Use modeling/simulation parameters with standard equivalent circuit models to predict correctly the expected performance of various general-purpose electronic circuits. 9. Demonstrate practical skills in the simulation, construction and testing of

	electronic circuits.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Diodes, BJTs and FETs transistors as individual devices and in use as simple linear amplifiers. In addition, use of transistors as high/low sided switches and level shifters. Analogue Circuit Modelling and Simulation: Schematic capture and simulation of analogue electronic components. Voltage regulators (including LDOs), voltage references and current sources. How to construct and deploy these components. Digital to Analogue and Analogue to Digital Converters, including SAR, Sigma-delta and flash Operational Amplifiers (including internal topology), covering different circuit configuration with focus on single supply (5V, 3.3V and 1.8V) operation. This will include instrumentation amplifiers and comparators Sources of electrical noise, passive and active filters, covering operation and design methods Signal Selection, processing and conversion (including multiplexing, ADC and DAC converters) Analogue oscillators, waveform generation and timers Non-linear circuits, including log amplifiers

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL)
الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	88	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**150**		

Module Evaluation
تقييم المادة الدراسية

As		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative	**Quizzes**	2	10% (10)	5 and 10	LO #1, #2 and #10, #11

assessment	**Assignments**	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Introduction to semiconductor theory
Week 2	PN junction and diode
Week 3	Diode circuits and applications
Week 4	Bipolar transistor theory
Week 5	Transistor Biasing circuits
Week 6	single stage amplifier
Week 7	Multistage amplifier and circuits coupling
Week 8	Transistor Oscillator circuits
Week 9	Mid exam.
Week 10	Op-amps and its Applications
Week 11	Field-effect transistor
Week 12	**Power Amplifiers**
Week 13	Electronic circuit Simulation Software.
Week 14	LM555, LM741, Circuits and application
Week 15	Exam.
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

Week	Material Covered
Week 1	Lab 1: Introduction, How to Use an Oscilloscope.
Week 2	Lab 2: Build and test diode circuits
Week 3	Lab 3: Transistor characteristics
Week 4	Lab 4: BJT Amplifier

Week 5	Lab 5: BJT Oscillator
Week 6	Lab 6: Modulation circuits
Week 7	Lab 7: Multi-vibrator circuit

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Peyton, A., & Walsh, V. (1993). Analog electronics with op-amps: a source book of practical circuits. Cambridge University Press.	Yes
Recommended Texts	Maheswari, L. K., & Anand, M. M. S. (2009). Analog electronics. PHI Learning Pvt. Ltd.	No
Websites	https://www.degruyter.com/document/doi/10.1515/9783110593860/html?lang=en	

Grading Scheme
مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية		
Module Title	**Mathematics 3**	**Module Delivery**
Module Type	**S**	☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial**
Module Code	**PHY2303**	
ECTS Credits	**5.00**	

SWL (hr/sem)	125			☐ **Practical** ☐ **Seminar**	
Module Level	UGII		**Semester of Delivery**		3
Administering Department	PHY		**College**	COS	
Module Leader	Fouad Hamza Abd		**e-mail**	sci.fouad.hamzah@uobabylon.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**		Ph.D.
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	22/04/2026		**Version Number**	1.0	

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	11. Evaluate first order differential equations including separable, homogeneous, exact, and linear. 12. Show existence and uniqueness of solutions. 13. Solve second order and higher order linear differential equations. 14. Create and analyze mathematical models using higher order differential equations to solve physical application problems. 15. Solve differential equations using variation of parameters. 16. Solve differential equations using Laplace transform.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	7. Will be able to explain the concept of differential equation. 8. Classifies the differential equations with respect to their order and linearity. 9. Will be able to solve first-order ordinary differential equations. 10. Will be able to solve systems of linear differential equations. 11. Will be able to use the Laplace transform in finding the solution of linear differential equations. 12. Upon completing this module, students are expected to have an introductory knowledge of mathematics ready for Maths 4.
Indicative Contents المحتويات الإرشادية	15. Ordinary Differential Equation. 16. First-Order Differential Equations. 17. Second -Order Differential Equations. 18. Laplace Transformation.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The primary strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	58	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	67	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**125**		

Module Evaluation
تقييم المادة الدراسية

As		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	4	4% (4)	5 and 12	LO #1, #2, #3 and #10, #11
	Assignments due	3	3% (3)	3 and 13	LO #3, #4 and #6, #7 and #11, #12
	Report	1	3% (3)	13	LO #5, #8 and #14
Summative assessment	**Midterm Exam**	2hr/2	30% (30)	7 and 15	LO #1 - #6 and #7-#13
	Final Exam	3hr	60% (60)	13	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Ordinary Differential Equation - Direct Integration.
Week 2	Separable Differential Equations.
Week 3	Exact and Linear ODE.
Week 4	Physical Applications of First-Order Differential Equations.
Week 5	Homogeneous Linear ODE with Constant Coefficients.

Week 6	Nonhomogeneous Linear ODE with Constant Coefficients.
Week 7	Mid-term Exam 1
Week 8	Variation of Parameters
Week 9	Euler's Differential Equation.
Week 10	Power Series Method to Solve ODE.
Week 11	Physical Applications of 2nd ODE.
Week 12	The Laplace Transform.
Week 13	Inverse Laplace Transform.
Week 14	Solving ODE by Using the Laplace Transform.
Week 15	Mid-term Exam 2
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Calculus by Thomas Finney 10th Edition – 2001	Yes
Recommended Texts	Calculus and analytic geometry _ Thomas	No
Websites	https://tutorial.math.lamar.edu/Classes/DE/IntroFirstOrder.aspx	

Grading Scheme
مخطط الدرجات

Group	**Grade**	التقدير	**Marks %**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**English language (2)**			**Module Delivery**	
Module Type	**B**			☐ **Theory** ☒ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**UOBAB0503036**				
ECTS Credits	2.00				
SWL (hr/sem)	**50**				
Module Level	UGII		**Semester of Delivery**	3	
Administering Department	PHY		**College**	COS	
Module Leader	Dr. Laith Talib Hadi Taj-Aldeen		**e-mail**	sci.layth.talib@uobabylon.edu.iq	
Module Leader's Acad. Title	Assistant Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	22/04/2026		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1- Student recognizes and understand some accents in the English language. 2- To be able to follow a dialogue between two or more, lecture, and even a TV program in English and to understand the content. 3- Expand the student vocabulary base and his ability to distinguish between the common and scientific English language. 4- Knowing the multiple meanings of words.

	5- Not only comprehending the meaning of a sentence but also understanding the hidden meaning in an English sentences. 6- To build a constructive dialogue between the student and an English-speakers. 7- Mastering specific grammar points, expanding the student's vocabulary, improving, and enhancing his listening. 8- Seeking practice English in real-life situations, like conversing with native English speakers by using audio and video records.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- Identifying and knowing the meaning of English words spoken in various accents. 2- Distinguishing between the common and scientific English language. 3- Familiarize the student with the organization of the course. Understand how units, lessons, examples, and activities are structured so he can effectively navigate through the material. 4- Distinguish between the various usages of the same word. 5- Identifying not only their parent meaning and the implied meaning for English sentences. 6- Recognize an unconstructed sentence and being able to re-construct it correctly. 7- Using the correct terminology when talking or writing date, time, and numbers. 8- Using grammar to structure sentences correctly.
Indicative Contents المحتويات الإرشادية	<u>Units (1-4)</u> Right word, wrong& word, Verbs of similar meaning (do/make speak/talk), Adjectives and nouns that go together (important person/meeting), Prepositions (crazy about married to good at), Words with two meanings. Making conversation, expressing interest (Oh, really?, How lovely?), short answer (No, I didn't, yes I am), Questions and answers. Past tenses, past simple (how far did he walk?, their journey began in 2008), past continuous (I was working in the forest when, I met Ed). Quantity, Much and Many (how much milk?, how many eggs?), Some and Any (some apples, any bananas), something / someone / somewhere, articles (a shopkeeper, an old village). [12 hrs.] <u>Units (5-7)</u> Verb patterns, future forms, phrasal verbs (Literal, Idiomatic), expressing doubt and certainty. Using What…….like?, Comparative and superlative adjectives (big, bigger, biggest), Synonyms (clever / intelligent , angry/annoyed), Antonyms (easy / difficult, noisy / quiet). Present perfect (unfinished past with for and since), Indefinite past (she's written several books), Ever and never (Have you ever been in danger?). [8 hrs.] <u>Unit (8-9)</u> Have to (she has to train hard, I do not have to work late), Should (You should talk to your parents), Must (He must get professional help), Past perfect, Narrative tenses, Joining sentences- conjunctions. [6 hrs.] <u>Unit 10</u> Passives, words that go together on the phone saying phone numbers (077700900333). [2 hrs.]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The strategy employs a well-balanced curriculum that covers all language skills. It integrates grammar instruction with practical application through engaging activities, exercises, and authentic materials. Students actively participate in the learning process through interactive exercises and activities. They are encouraged to contribute, ask questions, and collaborate with their peers, creating a dynamic and engaging classroom. Students engage in various speaking activities, role-plays, discussions, and pair work exercises to apply what they have learned in meaningful contexts. The strategy focuses on developing pronunciation skills and improving listening comprehension. Students are provided with audio materials and guided practice to develop accurate pronunciation, intonation, and rhythm.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	30	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	20	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**50**		

Module Evaluation
تقييم المادة الدراسية

As		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	5% (5)	4 and 9	LO #1, #2, #3 and #8, #9, #10
	Assignments	2	10% (10)	5 and 13	LO #1, #2, #3, #4 and #6, #7, #8, #9
	Report	1	10% (10)	Continuous	All
Summative assessment	**Midterm Exam**	2hr	25% (25)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	**Material Covered**
Week 1	Introduction + Unit one: title (Getting to know you) part one.
Week 2	Unit one: title (Getting to know you) part two.
Week 3	Unit Two: title (Whatever makes you happy).
Week 4	Unit Three: title (What's in the news?).
Week 5	Unit Four: title (Eat, drink, and be merry!) part one.
Week 6	Unit Four: title (Eat, drink, and be merry!) part two.
Week 7	**Mid-term Exam.**
Week 8	Unit Five: title (Looking forward).
Week 9	Unit Six: title (The way I see it).
Week 10	Unit Seven: title (Living history) part one.
Week 11	Unit Seven: title (Living history) part two.
Week 12	Unit Eight: title (Girls and boys).
Week 13	Unit Nine: title (Time for a story) part one.
Week 14	Unit Nine: title (Time for a story) part two.
Week 15	Unit Ten: title (Our interactive world).
Week 16	**Final Exam.**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week	**Material Covered**
Week 1	Non
Week 2	Non
Week 3	Non
Week 4	Non
Week 5	Non
Week 6	Non
Week 7	Non

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	New Headway Pre-Intermediate, Fourth edition.	Yes

Recommended Texts	1- An A-Z of English Grammar & Usage - Geoffrey Leech. 2- Working with English Prepositions - Diane Hall.	No
Websites	1- http://www.englishpage.com 2- http://www.headwayonline.com	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks %**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Modern Physics (2)**			**Module Delivery**	
Module Type	**C**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**PHY2401**				
ECTS Credits	**7.00**				
SWL (hr/sem)	**150**				
Module Level	UGx11 UGII		**Semester of Delivery**	4	
Administering Department	PHY		**College**	COS	
Module Leader	Musa Kadhim Mohsin		**e-mail**	**sci.musa.kadhim@ uobabylon.edu.iq**	
Module Leader's Acad. Title	Assistant Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	

Peer Reviewer Name	Name	e-mail	E-mail
Scientific Committee Approval Date	22/04/2026	Version Number	1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. Explain and discuss wave property of particles and to apply it. 2. To discuss the behavior the particles as waves. 3. Describe the group waves. 4. Explain and discuss the uncertainty principle of Heisenberg. 5. To discuss the theoretical and experimental progress of the atomic. 6. Develop the students knowledge of the basis of the Schrödinger equation. 7. To investigate the effect of atomic structure on the properties of atoms. 8. Develop the students skills to apply the theoretical knowledge in the laboratory. 9. Learning the students on the atomic models according to historical order. 10. Explain and discuss the atomic spectra and energy levels of toms. 11. Develop the students skills to apply the selection rules on the allowed and forbidden transition. 12. To investigate the effect of exclusion principle and electron spin on the properties of complex atoms. 13. Improve the students skills to analyze, construct, and compare the information and knowledge to deduce the conclusion. 14. Enhance the students sense in dealing with lecture room, laboratory, their friends, and their lectures. 15. Improve the skills of students in practical fields. 16. To make the students interested in the science of atomic physics.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks. 8. Discuss the behavior of light as a waves. 9. Discuss the behavior the particles as waves.. 10. Discuss the basics of Special theory of relativity and the importance periodicity. 11. Explain and discuss the uncertainty principle of Heisenberg. 12. Discuss the behavior of light as particles. 13. Discuss the atomic spectra and energy levels of toms.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Modern Physics provides the basis for the most important technological advances of

	the 20th century and 21st century. It also provides a wide range of opportunities to 'see' the effects of Classical Physics and Quantum Physics in atoms. The purpose of this course is to provide an introduction to the relative and quantum theory in order to enable to understands the atomic physics. We will focus upon the fundamental unifying concepts important in understanding the properties of nuclei and electrons in atoms.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	88	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	58	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**150**		

Module Evaluation تقييم المادة الدراسية					
As		**Time/Number**	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	**Material Covered**
Week 1	Time independent Schrödinger equation(TISE)
Week 2	operator, expectation values, the Harmonic Oscillator.
Week 3	**Quantum Theory of Hydrogen Atom:** Schrödinger equation for the hydrogen Atom
Week 4	quantum numbers
Week 5	Spectroscopic terms
Week 6	The normal Zeeman effect
Week 7	**Atoms of multiple electrons**: Electron spin, spin orbit coupling.
Week 8	Pauli exclusion principle, electron configurations.
Week 9	Hund's rule, total angular momentum
Week 10	LS-coupling, jj- coupling, one electron spectra, two electron spectra.
Week 11	**Molecular physics:** Rotational energy levels
Week 12	vibrational energy levels , Electronic spectra of molecules. .
Week 13	Radioactive Decay: Discovery of Radioactivity, Rate of Decay
Week 14	Half Life and Mean Life, Conservation Laws in Radioactive Decays.
Week 15	Alfa Decay, Beta Decay, Gamma Decay.

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week	**Material Covered**
Week 1	Lab 1:
Week 2	Lab 2:
Week 3	Lab 3:
Week 4	Lab 4:
Week 5	Lab 5:
Week 6	Lab 6:
Week 7	Lab 7:

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

Required Texts	Arthur Beiser, Concepts of Modern Physics, Sixth Edition, McGraw-Hill Companies, Inc., 2003.	No
Recommended Texts	Raymond A. Serway, Clement J. Moses, Curta A. Moyer, Modern Physics, *Third Edition*, Thomson Learning, Inc.2005	Yes
Websites	Lecturers, Internet.	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks %**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Statistical thermodynamic**			**Module Delivery**	
Module Type	**C**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**PHY2402**				
ECTS Credits	**8**				
SWL (hr/sem)	**150**				
Module Level	UGx11 UGII		**Semester of Delivery**	4	
Administering Department	PHY		**College**	COS	
Module Leader	Hussein Hakim Abed		**e-mail**	Sci.hussein.hakim@uobabylon.edu.iq	
Module Leader's Acad. Title	Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	

Peer Reviewer Name	Name	e-mail	E-mail
Scientific Committee Approval Date	22/04/2026	Version Number	1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	None

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1- To study the relationship between the macroscopic and microscopic characteristics of a group of particles. 2- To interested that, the statistical thermodynamic is controlled by a set of laws called the laws of statistical distribution, where it is used to find the most probable way to distribute a certain amount of energy among a number of particles. 3- To derive the Maxwell- Boltzmann distribution 4- To derive the Fermi-Dirac distribution 5- To define, and explain the physical significance of: the chemical potential; the Fermi energy; and the Fermi temperature 6- To sketch the energy distribution for particles in a Fermi gas 7- To derive the Bose-Einstein distribution for a system of indistinguishable bosons.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks. 1. Explain that the wave function for a system of fermions must be antisymmetric under exchange of any two particles 2. Derive the Maxwell- Boltzmann distribution 3. Derive the Fermi-Dirac distribution 4. Show that, for a dilute system, the Fermi-Dirac distribution can be approximated by the Maxwell- Boltzmann distribution 5. Define, and explain the physical significance of: the chemical potential; the Fermi energy; and the Fermi temperature 6. Derive an approximate expression for the chemical potential of a Fermi gas, including the temperature dependence to second order 7. Sketch the energy distribution for particles in a Fermi gas 8. Derive expression for the total energy and the heat capacity of a Fermi gas 9. Derive the equation of state for a Fermi gas at temperatures small compared to the Fermi temperature

	10. Derive an expression for the magnetic susceptibility of a material whose magnetic properties are dominated by a Fermi gas of electron 11. Explain that the wave function for a system of identical bosons must be symmetric under the interchange of any two bosons; and show that this property allows an unlimited number of bosons to occupy any given state. 12. Derive the Bose-Einstein distribution for a system of indistinguishable bosons. 13. Apply the Bose-Einstein distribution to a Bose-Einstein gas, to show 14. the existence of the Bose-Einstein condensation below the Bose temperature. 15. Derive the heat capacity of a Bose-Einstein gas, below and above the Bose temperature. 16. Explain the difference between a Bose-Einstein gas, and a gas of photons.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. PART A Classical Statistics of Maxwell-Boltzmann [15 hrs] PART B The Fermi-Dirac distribution [15 hrs] PART C The Bose-Einstein distribution [15 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ أسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	88	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**150**		

Module Evaluation
تقييم المادة الدراسية

As		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	Midterm Exam	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

Week	Material Covered
Week 1-5	Classical Statistics of Maxwell-Boltzmann
Week 6-10	The Fermi-Dirac distribution
Week 11-14	The Bose-Einstein distribution
Week 15	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus)
المنهاج الاسبوعي للمختبر

Week	Material Covered
Week 1	Lab 1:
Week 2	Lab 2:
Week 3	Lab 3:
Week 4	Lab 4:
Week 5	Lab 5:
Week 6	Lab 6:
Week 7	Lab 7:

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	ايدري،2015 الميكانيك الاحصائي، باديس و الترموديناميك	Yes
Recommended Texts	Mathematical Methods for Physics and Engineering Third Edition K.F. RILEY, M.P. HOBSON and S. J. BENCE 2006	No
Websites		

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks %**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية				
Module Title	**Analytical mechanics (1)**		**Module Delivery**	
Module Type	**Core**		☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☒**Seminar**	
Module Code	**UOBAB0503043**			
ECTS Credits	**5.00**			
SWL (hr/sem)	**125**			
Module Level	UGx11 UGII		**Semester of Delivery**	3
Administering Department	PHY		**College**	COS
Module Leader	Hikmat Adnan Jawad		**e-mail**	Sci.hikmat.adnan@uobabylon.edu.iq

Module Leader's Acad. Title	Assistant	Module Leader's Qualification	Ph.D.
Module Tutor	Name (if available)	e-mail	E-mail
Peer Reviewer Name	Name	e-mail	E-mail
Scientific Committee Approval Date	22/04/2026	Version Number	1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	25. Brief summary of all the contents that understood during semester 1. 26. Introducing some applications of complex motion such as Gyroscope. 27. increase the range of solvable problems by developing standard techniques with a wide range of applicability. 28. Understanding the generalized coordinates and degree of freedom. 29. Introducing the mechanical wave motions and oscillations. 30. Increase the ability of problem solving by introducing new solution using conservation of energy applications. 31. Understanding of torque and its relation with the moving bodies 32. understand the mathematical structure of mechanics. 33. introduction to the basic principles and methods of analytical mechanics covers Lagrangian and Hamiltonian dynamics.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks. 23. Recognize the problem related to total energy, Lagrange's method: mechanical systems, degrees of freedom, generalized coordinates. 24. Differentiate the mathematical concepts of the Lagrangian and variational principles. 25. Distinguish the ideas of Euler-Lagrange's equations, cyclic coordinates, constants of motion and Hamilton's. 26. Explain notations and concepts required for the solution of mathematical problem. 27. Identify the work-energy theorem. 28. The ability of students to solve complex problem depending on total energy concepts. 29. Comprehensive understanding of mathematical models of mechanics. 30. Satisfy all the applications related to linear, circular and rotational of moving complex systems.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 3. Oscillations 4. Description of oscillation

	5. Simple harmonic motion 6. Energy in simple harmonic motion 7. Simple pendulum 8. Damping oscillation 9. Driven oscillation and resonance 10. Wave Motions 11. Periodic waves 12. Wave function 13. Complex wave function 14. Wave equation 15. Energy of a wave 16. Standing waves 17. Lagrangian mechanics 18. Coordinate systems 19. Generalized coordinates 20. The principle of least action 21. The Euler-Lagrange equation 22. Applications of Lagrange equation **23.** Hamiltonion equation

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ أسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	58	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	67	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**125**		

Module Evaluation تقييم المادة الدراسية				
As	**Time/Number**	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**

Formative assessment	**Quizzes**	2	10% (10)	5 and 10	LO #1, #2 and #7, #8
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #8
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Oscillations Description of oscillation
Week 2	Simple harmonic motion Energy in simple harmonic motion
Week 3	Simple pendulum Damping oscillation
Week 4	Driven oscillation and resonance
Week 5	Wave Motions Periodic waves
Week 6	Wave function Complex wave function
Week 7	Wave equation Energy of a wave
Week 8	Standing waves
Week 9	Lagrangian mechanics
Week 10	Coordinate systems
Week 11	Generalized coordinates
Week 12	The principle of least action
Week 13	The Euler-Lagrange equation
Week 14	Applications of Lagrange equation
Week 15	Hamiltonion equation
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Hand, Louis N., and Janet D. Finch. *Analytical mechanics*. Cambridge University Press, 1998.	Yes

Recommended Texts	Lurie, Anatolii Isakovich. *Analytical mechanics*. Springer Science & Business Media, 2013.	No

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks %**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
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Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

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MODULE DESCRIPTION FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Digital Electronics**			**Module Delivery**	
Module Type	**C**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**PHY2403**				
ECTS Credits	**6.00**				
SWL (hr/sem)	**150**				
Module Level	UGx11 UGII		**Semester of Delivery**	4	
Administering Department	PHY		**College**	COS	
Module Leader	Ali madlool neamah sabar		**e-mail**	Sci.ali.sabor@ uobabylon.idu.iq	
Module Leader's Acad. Title	Asst.Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	22/04/2026		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	To understand the following subjects: 7. Number systems and codes in digital electronics 8. Introduce the basic elements of digital circuits. 9. Basic Logic Gates 10. Combinational circuit. 11. Boolean Expression and Boolean Algebra. 12. Applied logic circuits. 13. Adders and Subtractors circuits 14. Sequential circuit 15. Flip Flop Basics – Types, Truth Table, Circuit, and Applications. 16. Shift Register, parallel and serial. 17. Analog-to-Digital circuits. 18. Digital-to-Analog circuits. 19. Digital counter circuits, Up counters. Down counters. Frequency division. 20. Basic memory circuits.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	10. To acquire the basic knowledge of digital logic levels and application of knowledge to understand digital electronics circuits. 11. To prepare students to perform the analysis and design of various digital electronic circuits. 12. To introduce the basic concepts and laws involved in the Boolean algebra and logic families and digital circuits. 13. To familiarize with the different number systems, logic gates, and combinational and sequential circuits utilized in the different digital circuits and systems. 14. Provide ability to design and analysis of the digital circuit and system. 15. Understand the basic software tools for the design and implementation of digital circuits and systems. 16. Reinforce theory and techniques taught in the classroom through experiments and projects in the laboratory. 17. To understand the working principle of data processing circuits, arithmetic circuits, and sequential circuits. 18. Students will get an overview of microprocessor architecture and programming.

Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Numbers systems, Binary numbers, Boolean algebra, Boolean minimisation, Combinational circuits, Logic families, flip flops Counters, Multivariable Boolean reduction, Synchronous and asynchronous sequential circuits, Programmable logic design techniques Logic Gates RTL, DTL, TTL, ECL, ICL, HTL, NMOS & CMOS logic gates, Circuit diagram and analysis characteristics and specifications, tri-state gates. Combinational Circuits Problem formulation and design of combinational circuits, Adder / Subtractor, Encoder / decoder, Mux/Demux, Code-converters, Comparators, Implementation of combinational logic using standard ICs, ROM, EPROM, EEPROM, PAL, PLA and their use in combinational circuit design. Sequential Circuits Flipflops - SR, JK, T, D, Master/Slave FF, Triggering of FF, Analysis of clocked sequential circuits - their design, State minimization, state assignment, Circuit implementation, Registers-Shift registers, Ripple counters, Synchronous counters, Timing signal, RAM, Memory decoding, Semiconductor memories. Fundamental Mode Sequential Circuits Stable, Unstable states, Output specifications, Cycles and Races, Racefree Assignments, Hazards, Essential hazards, Pulse mode sequential circuits.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	This module will be presented to the students through a series of lectures, tutorials, practicals and investigations. Learning materials will include lecture notes and technical demonstrations. It is preferred that students study both analogue and digital elements in parallel. Throughout the course, so that students are exposed to the differences and similarities in both fields and are able to better reflect on their experiences. Extensive use will be made of to supplement learning materials and provide quizzes and exams for the assessment. A 2-hour lecture will be provided weekly. The material for the weekly lecture will be made available beforehand, to allow students to prepare as necessary. Where relevant, further reading will be made available post-lecture. A 2-hour lab session will be provided weekly. The intent is for the student to put into practice the theory gained during the weekly lecture.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	88	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem)	**150**		

الحمل الدراسي الكلي للطالب خلال الفصل	

Module Evaluation
تقييم المادة الدراسية

As		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	Midterm Exam	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Number Systems and Codes
Week 2	Seven Basic Logic Gates
Week 3	Combinatorial Logic
Week 4	Boolean Algebra, De M organ's Theorem
Week 5	Arithmetic Operations and Circuits, Half Adder and Full Adder
Week 6	Flip-Flops and Registers. a.S-R Flip-Flop b. D Flip-Flop c. J-K Flip-Flop
Week 7	Counter Circuits: a. Asynchronous Counters b. Synchronous Counters
Week 8	Shift Registers: Serial/Parallel Data Conversions.
Week 9	**Mid exam.**
Week 10	Analog-to-Digital circuits
Week 11	Digital-to-Analog circuits
Week 12	Multivibrators: Astable
Week 13	Multivibrators: Monostable
Week 14	Schmitt Trigger
Week 15	**Exam.**
Week 16	**Revision for final exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week	**Material Covered**
Week 1	Lab 1: TTL ICs
Week 2	Lab 2: Breadboards and Building Digital Circuits. AND, OR and NOT Gates
Week 3	Lab 3: Basic Combinational Logic & Gates with Many Inputs
Week 4	Lab 4: DeMorgan's Theorem
Week 5	Lab 5: Half and full adder circuit, SN7486, SN7483
Week 6	Lab 6: Flip Flop circuit
Week 7	Lab 7: Universal Shift register SN74194.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Basic Digital Electronics, by Alvis Evans. Basic Digital Electronics: (Physics and Its Applications) by J.A. Strong.	No
Recommended Texts	M. Morris Mano, Michael D. Ciletti, "Digital Design", Prentice Hall of India Pvt. Ltd., 2008. Brian Holdsworth, Clive Woods, "Digital Logic Design", Elsevier India Pvt. Ltd., 2005. Samir Palnitkar, "Verilog HDL, A Guide to Digital Design and Synthesis", Prentice Hall of India Pvt. Ltd., 2005.	No
Websites	https://byjus.com/physics/digital-electronics/	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks %**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
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Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

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MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Democracy and Human Rights			**Module Delivery**	
Module Type	**B**				
Module Code	**UOBAB0503046**				
ECTS Credits	**2.00**				
SWL (hr/sem)	**50**				
Module Level	UGx11 UGI		**Semester of Delivery**	1	
Administering Department	PHY		**College**	COS	
Module Leader	Anam Mahdi jabber jawad		**e-mail**	Sci.anaam.mahdi@uobabylon.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	Ph.D.	
Module Tutor			**e-mail**		
Peer Reviewer Name	Name		**e-mail**		
Scientific Committee Approval Date	22/04/2026		**Version Number**		

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1- أن يدرس الطالب مفهوم حقوق الانسان . 2- أن يدرس الطالب التطور التاريخي لمفهوم حقوق الانسان ونشاتها في جميع العصور . 3- أن يهتم الطالب بدراسة انواع الحقوق والتطور التاريخي له 1.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- التعرف على مفهوم حقوق الانسان وتطورها والمفهوم التاريخي لها 1. 2- فهم المصطلحات التي ترتبط بحقوق الانسان كمفهوم الديمقراطية والحرية 2. 3- استيعاب حقوق الانسان التي يتضمنها الدستور العراقي 3. 4- معرفة التعاريف المحددة لمفهوم الديمقراطية 4.
Indicative Contents المحتويات الإرشادية	المقدمة الباب الاول : في حقوق الانسان الفصل الاول : حقوق الانسان في الحضارات القديمة الفصل الثاني : حقوق الانسان في الشرائع والاديان السماوية الفصل الثالث : مصادر حقوق الانسان الفصل الرابع : ضمانات حقوق الانسان الباب الثاني : في حقوق الطفل الفصل الاول : نشأة وتطور قواعد حقوق الطفل الفصل الثاني : حقوق الطفل في الاسلام الباب الثالث : في الديمقراطية

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	تساهم المحاضرات في اغناء المعرفة للطالب وكذلك الامتحانات الشفهية والتحريرية

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	30	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	20	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**50**		

Module Evaluation تقييم المادة الدراسية					
As		**Time/Number**	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	15%		
	Assignments				
	Projects / Lab.				
	Report	1	10%		

Summative assessment	**Midterm Exam**	2hr	50%		
	Final Exam	3hr	50% (50)		
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	**Material Covered**
Week 1	المقدمة الباب الاول : في حقوق الانسان الفصل الاول : حقوق الانسان في الحضارات القديمة
Week 2	حقوق الانسان في الحضارات اليونانية والمصرية
Week 3	حقوق الانسان في حضارات العراق القديمة
Week 4	حقوق الانسان في الشرائع والاديان السماوية
Week 5	حقوق الانسان في الاسلام
Week 6	مصادر حقوق الانسان
Week 7	امتحان الشهر الاول
Week 8	مفهوم الديمقراطية وجذورها وتطورها
Week 9	اشكال الديمقراطية
Week 10	الديمقراطية شبه المباشرة
Week 11	الديمقراطية التمثيلية
Week 12	المجلس النيابي
Week 13	مفهوم الانتخاب
Week 14	امتحان الشهر الثاني
Week 15	تنظيم عملية الانتخاب
Week 16	مراجعة شاملة للمادة قبل الامتحان النهائي

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week	**Material Covered**
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	

Week 7	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	حقوق الانسان والطفل والديمقراطية / د. ماهر علاوي – د. رعد ناجي الجدة / 2009 بغداد	نعم
Recommended Texts	حقوق الانسان والديمقراطية ، تطورها ، مضامينها ، حمايتها / د. رياض عزيز هادي – بغداد 2005	لا
Websites		

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks %**	**Definition**
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