

Undergraduate Program Subject Outline

School of Engineering

SUBJECT NAME: PHYSICS FOR ENGINEERS

Course code:	PHYS143	Section:	Winter
Credit Points:	6	Year	2024
Session	Winter	Duration:	11 Weeks
Pre-requisite(s)	None	Co-requisite(s)	None
Mode of Delivery:	F2F		
Final Exam Passing Requirement:	Weighted average mark for four exams $\geq 40\%$		

Timetabling Information can be found at MY|UOWD, <https://my.uowdubai.ac.ae/>

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Consultation:	See Moodle		

1 SUBJECT DESCRIPTION

Vectors and their applications; an introduction to the physical laws of electricity and magnetism, leading to an explanation of the generation of electromagnetic waves and some basic ideas in communication theory. Electric charge and Coulomb's law, electric fields, potential differences, capacitance, dielectrics and relative permittivity, electric current, resistance, Ohm's "law", superconductivity, DC circuits and Kirchhoff's laws, magnetic fields and forces, electromagnetic waves and the EM spectrum, carrier waves, modulation and bandwidth. Waves; reflection and refraction; interference; diffraction; polarization optical instruments; quantum physics; waves and particles; atomic physics; the Bohr atom.

2 CONTRIBUTION TO PROGRAM LEARNING OUTCOMES (PLO)

The activities in this course contribute to achieving the following program learning outcomes:

Program: Engineering	
PLO1	Demonstrate professional knowledge with a strong grounding in engineering and awareness of current local and international trends and challenges.
PLO2	Navigate disciplinary literature with particular skills in gathering & synthesising information independently to support an argument or strategy.

PLO3	Implement common research methods in the field of engineering, analyse data & evaluate the validity of findings and exercise critical judgement in determining new directions and strategies for carrying out further investigation.
PLO4	Draw from established engineering concepts, methods and industry standards to develop innovative solutions to complex engineering problems by completing a research project relating to the respective engineering major.
PLO5	Communicate clearly and coherently in writing to a range of audiences, with an ability to integrate knowledge, research, data, analysis and critical evaluation.
PLO6	Communicate verbally to a range of audiences using appropriate language in presentations, consultation and negotiation.
PLO7	Work productively as part of a team with the capacity for leadership, recognising the roles, responsibilities and accountabilities of team members.
PLO8	Show respect for the views, values and culture of others in settings involving colleagues, clients, communities and end users, and consider alternate perspectives in design and project management.
PLO9	Make complex considerations in regards to professional ethics and accountability, account for and mitigate risk, and operate with a commitment to professionalism in all work.
PLO10	Appreciate the importance of sustainable engineering design, and seek to maximise positive social and environmental outcomes in engineering design, practice and development.

Course PHYS143 Upon successful completion of this subject, a student should be able to:		PLOs
LO1	Explain the fundamental laws of physics and its application	1
LO2	Apply the laws of Physics to solve problems in the field of engineering	1
LO3	Demonstrate ability to conduct lab experiments in a collaborative environment	5
LO4	Identify, gather, retrieve, evaluate and operate on textual, graphical and numerical information as applied to the study and practice of physics and engineering.	1

3 SUBJECT SCHEDULE

3.1 LECTURE SCHEDULE

Week	Lecture Topic(s)	Learning Outcomes	Session Type	Delivery format	Related supporting materials	Assessment Formative (F) Summative (S)
1 Module (M) 1	Lecture A: Electric charge and Field Lecture B: Gauss Law	1,2	Lecture (L) / Tutorial (T)	F2F	L: Ch 23 & 24 T: Ch 23 & 24	Online quiz (S)
2 (M 1)	Lecture A: Electric Potential Lecture B: Capacitance and Dielectrics	1,2	L/T	F2F	L: Ch 25 & 26 T: Ch 25 & 26	Online quiz (S)



3 (M 1)	Lecture A: Current and Resistance Lecture B: Direct-Current Circuits	1,2	L/T	F2F	L: Ch 27 & 28 T: Ch 27 & 28	Module 1 Exam (S)
4 (M 2)	Lecture A: Magnetic Fields Lecture B: Sources of Magnetic Field	1,2	L/T	F2F	L: Ch 29 & 30 T: Ch 29 & 30	Online quiz (S)
5 (M 2)	Lecture A: Faraday's Law Lecture B: Inductance	1,2	L/T	F2F	L: Ch 31 & 32 T: 31 & 32	Online quiz (S)
6 (M 2)	Lecture A: Alternating-Current Circuits Lecture B: Electromagnetic Waves	1,2	L/T	F2F	L: Ch 33 & 34 T: 33 & 34	Module 2 Exam (S)
7 (M 3)	Lecture A: The nature of Light and Laws of Geometric Optics Lecture B: Image Formation	1,2	L/T	F2F	L: Ch 35 & 36 T: Ch 35 & 36	Online quiz (S)
8 (M 3)	Lecture A: Wave Optics Lecture B: Diffraction Patterns and Polarization	1,2	L/T	F2F	L: Ch 37 & 38 T: Ch 37 & 38	Module 3 Exam (S)
9 (M 4)	Lecture A: Relativity Lecture B: Introduction to Quantum Physics	1,2	L/T	F2F	L: Ch 39 & 40 T: Ch 39 & 40	Online quiz (S)
10 (M 4)	Lecture A: Atomic Physics Lecture B: Nuclear Structure	1,2	L/T	F2F	L: Ch 42 & 44 T: Ch 42, 44	Module 4 Exam (S)
11	Revision					

3.2 COMPUTER LABS SCHEDULE

Week	Computer Lab Activities	Learning Outcome(s)
1	Lab 1: Electric Field Mapping	3,4
2	Lab 2: Internal Resistance – Electrical Meter	
3	Lab 3: RC Circuits & Electrical Meters	
4	Lab 4: Equivalent Resistance	
5	Lab 5: Magnetic Field	
6	Lab 6: LC and RLC Circuits	
7	Lab 7: Lenses and Optical Instruments	
8	Lab 8: Interference and Diffraction	
9	Lab 9: The Photoelectric Effect	
10	Lab 10: Spectra	

4 SUPPORTING MATERIALS

Books, Articles, Videos, Podcasts, etc. will be available on our Learning Management System (LMS).

4.1 REQUIRED TEXTBOOK

R. A. Serway & J. W. Jewett, Physics for Scientists and Engineers with Modern Physics, 10th edition, Cengage Learning, 2019.

4.2 RECOMMENDED READINGS

- D. Halliday, R. Resnick, and J. Walker, Fundamentals of Physics, John-Wiley, 11th edition, 2018.
- Hugh D Young, Philip W. Adams, Raymond Joseph Chastain, College Physics, Pearson, 11th Edition, 2020.
- Randall D Knight, Brian Jones, Stuart Field, College Physics: A Strategic Approach, Pearson, 4th Edition, 2019.
- Richard Wolfson, Essential University Physics, Pearson, Volume 2, 4th Edition, 2020.
- Douglas C. Giancoli, Physics for Scientists & Engineers, Pearson, Volumes 2 & 3, 5th Edition, 2020.
- Hugh D Young, Roger A. Freedman, University Physics, Pearson, 15th Edition, 2020.
- Randall D Knight, Physics for Scientists and Engineers: A Strategic Approach with Modern Physics, Pearson, 4th Edition, 2017.

4.3 ACCESS TO SUPPORTING MATERIALS

The University uses MOODLE as a Learning Management System (LMS) to support all coursework subjects. The subject site and supporting materials can be accessed via: <https://moodle.uowplatform.edu.au> And via UOWD Library.

5 ASSESSMENT

5.1 ASSESSMENT OF LEARNING OUTCOMES

Learning Outcome	Measures (Elements of Assessment)
LO1: Explain the fundamental laws of physics and its application	Exams, Online Quizzes
LO2: Apply the laws of Physics to solve problems in the field of engineering	Exams, Online Quizzes
LO3: Demonstrate ability to conduct lab experiments in a collaborative environment	Laboratory Reports and Quizzes
LO4: Identify, gather, retrieve, evaluate and operate on textual, graphical and numerical information as applied to the study and practice of physics and engineering.	Exams, Online Quizzes, Laboratory Reports and Quizzes

5.2 ASSESSMENT TASKS

Learning Outcome	Assessment 1 Module 1 Exam 16.25%	Assessment 2 Module 2 Exam 16.25%	Assessment 3 Module 3 Exam 16.25%	Assessment 4 Module 4 Exam 16.25%	Assessment 5 Laboratory Reports and Quizzes 20%	Assessment 6 Online Quizzes 15%
LO 1	x	x	x	x		x
LO 2	x	x	x	x		x
LO 3					x	
LO 4	x	x	x	x	x	x
Group (G)/ Individual (I)	I	I	I	I	G	I
Total Marks	100	100	100	100	20	15
Due Date	Saturday, Week 3	Saturday, Week 6	Saturday, Week 8	Saturday, Week 10	Weekly starting from Week 1	Every Sunday on Weeks 1,2,4,5,7,9.

Assessment Tasks 1 – 4:	Modular Exams
Type:	Individual
Description:	In-class Exams
Learning Outcome Measured:	1,2,4
Total Marks:	100 (each exam)
Weighting:	65% (16.25% for each exam)
Due Date:	On Saturdays of week 3, week 6, week 8, and week 10.

OUTLINE AND REQUIREMENTS

There are four exams, one exam for each module. Module 1 exam covers chapters 23 – 28, Module 2 exam covers chapters 29 – 34, Module 3 exam covers chapters 35 – 38, and Module 4 exam covers chapters 39, 40, 42, and 44.

MARKING CRITERIA

The test will be marked based on the correctness of the answers.

Assessment Task 5:	Laboratory Reports and Quizzes
Type:	Group
Description:	Reports / Quizzes
Learning Outcome Measured:	3,4
Total Marks:	20 for each lab
Weighting:	20%
Due Date:	By the end of the lab session. If more time is required, it should be submitted before the next session begins.

OUTLINE AND REQUIREMENTS

There will be ten weekly lab sessions in PHYS143 starting from Week 1. Every group of three students has to submit a lab report to Moodle by the due date. There will be also a lab quiz at the end of each lab session. The reports weight is 10% and the quizzes weight is 10%.

MARKING CRITERIA

Correctness of the answers, the logic of the results obtained, and the submission of the reports on time. Late submissions will not be marked (zero mark). Active participation and engagement in the lab activities are assessed and marked.

Assessment Task 6:	6 Online Quizzes
Type:	Individual
Description:	MCQs on Moodle
Learning Outcome Measured:	1,2,4
Total Marks	10 for each quiz
Weighting:	15%
Due Date:	On Sundays of Weeks 1, 2, 4, 5, 7, and 9

OUTLINE AND REQUIREMENTS

Starting from Week 1, a quiz every Sunday, unless there is a modular exam, will be available on Moodle at 11:00 am. The quiz will stay open for one hour. Every quiz has ten Multiple-Choice Questions (MCQs). The assessment materials for the quizzes are: Week 1 (Ch 23 & 24), Week 2 (Ch 25 & 26), Week 4 (Ch 29 & 30), Week 5 (Ch 31 & 32), Week 7 (Ch 35 & 36), Week 9 (Ch 39 & 40).

MARKING CRITERIA

Correctness of answers.

LATE SUBMISSIONS:

Please note that late submissions will incur a penalty of 20% per day, including weekends.

5.3 GRADES AWARDED

The approved grades of performance and associated ranges of marks for undergraduate subjects are:

High Distinction (HD)	85 – 100%
Distinction (D)	75 – 84%
Credit (C)	65 – 74%
Pass (P)	50 – 64%
Pass Supplementary (PS)	50%
Fail (F)	0 – 49% (and not meeting the attendance requirements)
Technical Fail (TF)	Not meeting the final exam passing requirements – see the Assessment Policy PP-REG-DB-2.1

5.4 SATISFACTORY COMPLETION REQUIREMENTS

In order to be considered for a grade of Pass (P) or better in this subject, students must achieve the minimum required mark in the Final Examination (see page 1 for required score); students who obtain

a composite mark greater than or equal to 50% but do not satisfy the Final Examination minimum pass requirements in the final examination will be awarded a “Technical Fail” grade.

Students must ‘reasonably’ complete all assessment tasks (including the required score for the Final Examination,) and submit these as specified in the subject outline. ‘Reasonable’ completion of an assessment task will be determined based on the instructions given to the student including: word length, demonstration of research and analysis where required, adherence to the Plagiarism Policy guidelines, and completion of each section/component of the assessment. Failure to submit all assessment tasks may result in a Fail grade awarded for the subject.

6 RELEVANT POLICIES AND DOCUMENTS

All students must read and be familiar with the following UOWD policies and documents, which are available on the Student Online Resources (my.uowdubai.ac.ae) website by following the Policies link:

- Academic Grievance Policy
- Academic Integrity Policy
- Campus Access and Order Rules
- Code of Conduct – Library Users
- Code of Practice – Students
- Copyright Policy
- Intellectual Property Policy
- Library Regulations
- Minimum Rate of Progress
- Music, Video and Software Piracy
- Non-Discriminatory Language and Practice & Presentation Policy and Guidelines
- Special Consideration Policy & Procedure
- Student Attendance Policy
- Student Conduct Rules
- Rules for use of UOWD ITTS Facilities
- Teaching and Assessment: Code of Practice – Teaching
- Teaching and Assessment: Assessment and Feedback Policy
- Teaching and Assessment: Subject Delivery Policy

7 SSP & STUDIOSTY

SSP (Student Support Program) is a program committed to assisting students in developing their academic skills and getting the most out of their studies. As part of their services, SSP provides Peer Tutoring Program and Academic Workshops (<https://my.uowdubai.ac.ae/ssd/index.php>).

Studiosity is an online study tool that students can access 24 hours, 7 days a week! Students can receive feedback on submitted writing in less than 24 hours and receive one-to-one, personal help in real time with a subject specialist. The service can be accessed through the subject’s Moodle site.

For further information, please contact:

SSP Coordinator

ssp@uowdubai.ac.ae

Phone Number: +971 4 278 1756

8 ACADEMIC INTEGRITY

Plagiarism and cheating are serious offences that can lead to expulsion from the university. Students must be familiar with the *Academic Integrity* policy which outlines the procedure that will be followed in case of

academic misconduct including cheating and plagiarism. Please refer to *How to Avoid Plagiarism* available on the Student Online Resources website (<http://my.uowdubai.ac.ae>).

8.1 TURNITIN

Students are required to submit all written assignments in soft copy through the TurnItIn system which is available online at www.turnitin.com. Every student must have a TurnItIn account. Failure to submit an assignment through TurnItIn will result in marks for that assignment being withheld. **Students do NOT need to hand in a printed copy of the TurnItIn Originality Report.** More information about TurnItIn (including how to create an account and add a class) will be provided in the first lecture. Students can download Frequently Asked Questions (FAQs) about TurnItIn from the SSP section of UOWD website (<https://www.uowdubai.ac.ae/academic-resources/student-support-programs>).

TurnItIn information required to add this subject:

Class ID:	Moodle Link
Password:	Moodle Link

8.2 REFERENCE & IN-TEXT CITATION

For information about referencing and in-text citation please review the *Academic Writing Presentation* available on the Student Online Resources website (<http://my.uowdubai.ac.ae>).

8.3 UOWD RULES & POLICIES

For information about UOWD Rules and Policies, please go to the Student Online Resources website (<http://my.uowdubai.ac.ae>) and click on the POLICIES link.

9 ATTENDANCE REQUIREMENTS

Attendance in this subject is compulsory. Failure to attend all tutorials and computer labs as per the Student Attendance Policy may result in a FAIL grade. Students are strongly encouraged to become familiar with this policy (which can be found on the Online Resources website at my.uowdubai.ac.ae).

10 TUTORIAL/COMPUTER LAB ENROLMENTS

All students must sign up for one tutorial and/or computer lab in Week 1. Admission to a tutorial/computer lab will not be possible unless the student's name is on the Attendance List for that class. No changes will be allowed once a student has enrolled in a tutorial/computer lab.

11 SUPPLEMENTARY ASSESSMENTS

A supplementary assessment may be offered to students whose performance in this subject is close (45-49 in the final examination and 48-49 in the composite score) to that required to pass the subject, and are otherwise identified as meriting an offer of a supplementary assessment. The precise form of a supplementary assessment will be determined at the time the offer of a supplementary is made.

12 LECTURE CAPTURE

UOWD supports the recording of lectures as a supplemental study tool, to provide students with equity of access, and as a technology-enriched learning strategy to enhance the student experience.

To make your own recording of a lecture you **must** receive the explicit permission of the Educator and those people who are also being recorded.

You may only use recorded lectures, whether they are your own or recorded by the university, for your own educational purposes. Recordings cannot be altered, shared or published on another platform, without permission of the University. UOWD's Lecture Capture policy is underdevelopment.

13 SUSTAINABILITY

UOWD encourages all students to act in a sustainable manner when planning and submitting assessments. If possible, students should not use plastic items, such as folders, covers, and bindings, and other synthetic materials, for presentations, workshops, and other activities. Students are also encouraged to avoid unnecessary printing; and if printing is required, please consider printing double-sided and only printing essential illustrations avoiding blocks of any colour as the use of ink is harmful to the environment. Always behave in a sustainable way.