University of the West of Scotland

Module Descriptor

Session: 2024/25

Title of Module: Introductory Physics A			
Code: PHYS07007	**SCQF Level: 7 (Scottish Credit and Qualifications Framework)**	**Credit Points: 20**	**ECTS: (European Credit Transfer Scheme) 10**
School:	School of Computing, Engineering, and Physical Sciences		
Module Co-ordinator:	John F Smith		

Summary of Module

This module is one of two introductory physics modules offered at Level 7. The other Level 7 module is Introductory Physics B, in Trimester 2. The two modules are, however, self-contained and are not co-requisites. The module is a core module for students on the **Physics** degree programme; students on **Chemistry** and **Mathematics** degrees will find the content helpful. The course material is primarily delivered in lectures with complementary problems classes. The module also includes **laboratory classes** which enable students to put into practice the principles covered in the lectures. A brief outline of the content is given below.

Mechanics: calculus treatment of equations of linear motion; work energy theorem; rest mass; relativistic mass; relativistic energy; circular motion; simple harmonic motion; damping.

Gravitation: law of gravitation; gravitation potential; conservative fields; equipotentials; escape velocity; black holes.

Heat: temperature: scales, expansion, stress; heat: specific and latent heat, methods of transfer.

Gases: ideal gas law; kinetic model.

Wave phenomena: Introduction to wave motion (definitions of frequency, wavelength, intensity, amplitude); the travelling wave equation; phase and phase difference; superposition; the Doppler effect; interference by division of amplitude (thin film, air wedge, Newton's rings, anti-reflection coating); interference by division of wavefront (Young's double-slit experiment; the Fresnel biprism); polarization (Malus's law, the Brewster angle, polarization by scattering).

We have defined a set of Graduate Attributes that are the skills, personal qualities and understanding to be developed through your university experience that will prepare for life and work in the 21st century (https://www.uws.ac.uk/currentstudents/your-graduate-attributes/). The Graduate Attributes relevant to this module are listed below.

• Graduate Attributes - Academic: critical thinker; analytical; inquiring; knowledgeable; digitally literate; problem solver; autonomous; incisive; innovative

• Graduate Attributes - Personal: effective communicator; influential; motivated

• Graduate Attributes - Professional: collaborative; research-minded; enterprising; ambitious; driven

Module Delivery Method					
Face-To-Face	**Blended**	**Fully Online**	**HybridC**	**Hybrid 0**	**Work-Based Learning**
☒	☐	☐	☐	☐	☐
See Guidance Note for details.					

Campus(es) for Module Delivery						
The module will **normally** be offered on the following campuses / or by Distance/Online Learning: (Provided viable student numbers permit) (tick as appropriate)						
Paisley:	Ayr:	Dumfries:	Lanarkshire:	London:	Distance/Online Learning:	Other:
☒	☐	☐	☐	☐	☐	Add name

Term(s) for Module Delivery					
(Provided viable student numbers permit).					
Term 1	☒	Term 2	☐	Term 3	☐

Learning Outcomes: (maximum of 5 statements) **These should take cognisance of the SCQF level descriptors and be at the appropriate level for the module.** At the end of this module the student will be able to:	
L1	To demonstrate knowledge and understanding of introductory aspects of mechanics, gravitation, heat, and wave phenomena.
L2	To apply the knowledge and understanding to solve relevant numerical and non-numerical problems.
L3	To conduct prescribed laboratory experiments, collect and analyze data, identify sources of experimental uncertainties, and draw conclusions.

L4	Record experimental procedures and observations in a log book, and present an experiment in a formal lab report.

Employability Skills and Personal Development Planning (PDP) Skills	
SCQF Headings	During completion of this module, there will be an opportunity to achieve core skills in:
Knowledge and Understanding (K and U)	SCQF Level **7** Demonstrate and work with: • A broad knowledge of the technological skills that are required for success as a physicist or scientist. • Knowledge that is embedded in the main theories, concepts, and principles • An awareness of the evolving nature of the knowledge and understanding • An understanding of the difference between explanations based in evidence and other forms of explanation and of the importance of this difference.
Practice: Applied Knowledge and Understanding	SCQF Level **7** Use some of the basic and routine professional skills, techniques, practices, and materials used in physics.
Generic Cognitive skills	SCQF Level **7** • Present and evaluate arguments, information and ideas in physics • Use a range of approaches to addressing problems and issues in physics.
Communication, ICT and Numeracy Skills	SCQF Level **7** • Use a wide range of routine skills and some advanced skills in physics. For example: ▪ convey ideas in well-structured and coherent form ▪ use a range of forms of communication effectively in both familiar and new contexts ▪ use standard applications to process and obtain a variety of information and data ▪ use a range of numerical and graphical skills in combination ▪ use numerical and graphical data
Autonomy, Accountability and Working with others	SCQF Level **7** • Exercise some initiative and independence in carrying out defined activities • Take account of own and others' roles and responsibilities in carrying out and evaluating tasks • Work with others in support of current professional practice under guidance
Pre-requisites:	Before undertaking this module the student should have undertaken the following:

	Module Code:	**Module Title:**
	Other:	Higher, A Level, or AS-Level Physics or equivalent, Higher, A Level, or AS Level Mathematics or equivalent
Co-requisites	**Module Code:** MATH07003	**Module Title:** Mathematics of Space & Change

*Indicates that module descriptor is not published.

Learning and Teaching

This is an introductory Level-7 module, with a strong lecture-based component which facilitates the learning and teaching of new concepts and new ideas. However, physics is a practical subject, and there is also a significant practical component to the module. All of the material, from both lecture and practical classes, will be consolidated and supported in tutorials or problems classes in which the students can discuss issues and problems with the course material on an informal one-on-one basis with a member of staff.

The majority of the material of this module is presented in the form of lectures. The lecture notes (either presented traditionally to students in the lectures, or made available via the VLE) will be self-contained and will cover all of the areas of the module. A list of recommended text books will be issued which cover all aspects of the course which serve as a source of background information, greater detail or alternative explanations of the lecture material.

The lecture material will be put into practice in practical laboratory classes. The practical classes go hand-in-hand with the lecture classes - the lectures and the practical classes can be regarded as complementary. Students are expected to relate the material taught in lectures to the experiments performed in the practical classes.

Tutorials (or problems classes) will enable students to further test the material taught in lectures. Generally, Problem Sheets (containing several questions and problems) will be issued by the lecturers which will carried out by the students in their own time in advance of the tutorials; difficulties relating to solving the problems on the tutorial sheets can be discussed and remedied in the tutorials. Tutorials are thus of great value to the students as they facilitate informal contact with a member of staff, enabling misunderstandings and conceptual difficulties to be sorted out.

The tutorials are also of immense value to the staff: liaison between lecturer and tutors will enable problematic areas of the course material to be identified. As with most modules, the ability to communicate information and ideas effectively is very important to successful completion. Verbal communication will be encouraged in the tutorials while written communication will be necessary for the completion of submitted coursework and class tests, in particular, the submitted coursework will require new concepts and ideas to be described clearly and will require clearly-expressed solutions to set problems. A formal written laboratory report will require report-writing and organizational skills to be demonstrated.

Many aspects of this module (such as consolidation of lecture notes) require self-study but other aspects (such as practical work or discussions in tutorials) require an element of group work.

Learning Activities During completion of this module, the learning activities undertaken to achieve the module learning outcomes are stated below:	**Student Learning Hours** (Normally totalling 200 hours): (Note: Learning hours include both contact hours and hours spent on other learning activities)

Lecture/Core Content Delivery	24
Laboratory/Practical Demonstration/Workshop	12
Tutorial/Synchronous Support Activity	12
Independent Study	152
	200 Hours Total

****Indicative Resources: (eg. Core text, journals, internet access)**

he following materials form essential underpinning for the module content and ultimately for the learning outcomes:

· Young and Freedman, University Physics, Addison Wesley (2007) 12th Edition[ISBN: 978-0805321876]

· Serway and Jewett, Physics for Scientists and Engineers with Modern Physics, Thomson Learning (2007) [ISBN: 978-0495112402]

· Cutnell and Johnson, Physics, John Wiley (2006) [ISBN: 978-0471663157]

(**N.B. Although reading lists should include current publications, students are advised (particularly for material marked with an asterisk*) to wait until the start of session for confirmation of the most up-to-date material)

Attendance and Engagement Requirements

In line with the Student Attendance and Engagement Procedure: Students are academically engaged if they are regularly attending and participating in timetabled on-campus and online teaching sessions, asynchronous online learning activities, course-related learning resources, and complete assessments and submit these on time.

Equality and Diversity

The University's Equality, Diversity and Human Rights Procedure can be accessed at the following link: UWS Equality, Diversity and Human Rights Code.

Please ensure any specific requirements are detailed in this section. Module Co-ordinators should consider the accessibility of their module for groups with protected characteristics.

(N.B. Every effort will be made by the University to accommodate any equality and diversity issues brought to the attention of the School)

Supplemental Information

Divisional Programme Board	Engineering and Physical Sciences
Assessment Results (Pass/Fail)	Yes ☐No ☒
School Assessment Board	Physical Sciences
Moderator	Ryan Meeten
External Examiner	H Boston
Accreditation Details	Institute of Physics
Changes/Version Number	This version: v8 v1: version approved at 2010 post Portfolio-Review validation. v2: parts of the content (mechanics, gravitation and heat) swapped with content (electrical phenomena and electromagnetism) from the other level-7 Physics Module. v3: External Examiner details updated v4: Learning and teaching, and Assessment sections updated. v5: KIS changes made plus several other minor amendments - JFS 10/3/14 v6: The prerequisites were updated v7: Contact hours corrected. v8: Moderator updated, small corrections made, moved onto 24/25 template.

Assessment: (also refer to Assessment Outcomes Grids below)
The module has two categories of assessment:
• Coursework total 60% (one or more class tests assessing the material taught in the lectures [40%], submitted problem sheets [20%])
• Laboratory Work total 40%(supervised laboratory work [30%], formal laboratory report [10%])
(N.B. (i) **Assessment Outcomes Grids** for the module (one for each component) can be found below which clearly demonstrate how the learning outcomes of the module will be assessed. (ii) An **indicative schedule** listing approximate times within the academic calendar when assessment is likely to feature will be provided within the Student Module Handbook.)

Assessment Outcome Grids (See Guidance Note)

Assessment Type (Footnote B.)	Learning Outcome (1)	Learning Outcome (2)	Learning Outcome (3)	Learning Outcome (4)	Weighting (%) of Assessment Element	Timetabled Contact Hours
Class Test	✓	✓			40	2
Portfolio of Written Work	✓	✓			20	0
Assessment Type (Footnote B.)	**Learning Outcome (1)**	**Learning Outcome (2)**	**Learning Outcome (3)**	**Learning Outcome (4)**	**Weighting (%) of Assessment Element**	**Timetabled Contact Hours**
Laboratory/ Clinical/ Field notebook			✓	✓	30	12
Report of practical/ field/ clinical work			✓	✓	10	0
Combined Total For All Components					100	14