University of the West of Scotland

Module Descriptor

Session: 2024/25

Title of Module: Skills for Physics			
Code: PHYS07005	**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:	Marcus Scheck		

Summary of Module

The Level-7 module is compulsory for all Physics students. It is intended to teach skills that are helpful for a successful study of science and in particular Physics. It will cover experimental and analytical skills, math skills, computational skills, and communication skills. The course material will primarily be delivered in lectures with complementary small-group tutorials or problem classes. The module also includes practical classes which will enable students to put into practice the principles covered in the lectures and tutorials. One of the features of the module will be to develop communication skills in the form of presentations. Thus, this module will provide skills development in several areas: independent thought and problem solving, practical techniques, data evaluation, and computational skills. The syllabus is outlined below.

Laboratory skills
Understanding the context of a problem; making estimates; uncertainties in measurements; understanding data; probability distributions; linear regression; data analysis; use of typical laboratory equipment (e.g. oscilloscopes).

Computer and Programming skills
Bits and bytes; computer hardware; operating systems; general programming concepts; specific programming examples; Microsoft Office, C programming.

Maths skills
Quadratic equations; trigonometry; power and logarithm functions; vectors; basic vectors; linear dependence/independence of vectors; cross and dot product of vectors; triple products; matrices, calculation with matrices, determinants, sequences and series, convergence of series, geometric series and binominal series, series for the e-function, sine and cosine function

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/current- students/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					
This is a long, thin module stretching over two terms.					
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 the analytical, computational, laboratory, and communication skills that are required for success as a physicist.
L2	To demonstrate the ability to carry out prescribed laboratory assignments and data analysis.
L3	To demonstrate effective use of linear algebra and the terminology of sequences and series (logarithms, trigonometry, vectors, matrices, determinants etc) as part of the required skills.
L4	To demonstrate the ability to understand and write simple C or Python programmes.
L5	To demonstrate effective use of Microsoft Excel, Microsoft Word and Microsoft Power Point as part of the required skills.
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:**	**Module Title:**

*Indicates that module descriptor is not published.

Learning and Teaching

This is an introductory L7 Module with a strong lecture-based component which facilitates the learning and teaching of new concepts and new ideas. However, many of the issues taught in this Module require laboratory or computing work, so there is also a significant practical component to the module. The lecture notes (either taken by the students in the lecture class or made available via the Virtual Learning Environment) will be self-contained and will cover all of the areas of the module. A list of recommended textbooks 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.

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 small-group 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 comprehensive solutions to set problems.

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

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

Jenny Olive: - Maths: A Student's Survival Guide: A Self-Help Workbook for Science and Engineering Students [ISBN 0521017076]

Taylor, An introduction to Error Analysis, University Science Books (1997) [ISBN: 978-0935702422]

H. M. Deitel, P. J. Deitel, "C How to Program [ISBN: 978-0130895714]

(**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	**4.0** Module descriptor amended to conform to the new template format and to reflect outcomes from ILR 2023.

Assessment: (also refer to Assessment Outcomes Grids below)
The module has three categories of assessment:
• Assessment 1 - 1x class test including math skills and the laboratory/uncertainty analysis parts worth 40% of the final grade.
• Assessment 2 1x Coursework Math Skills part consisting of two pieces of coursework (one in each term), worth 30% of the final grade

• Assessment 3 1x Portfolio of Coursework (1x Laboratory assessment, 1x Programming assessment, and 1x Presentation), worth 30% of the final grade
(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)

Component 1 – Class Test							
Assessment Type (Footnote B.)	**Learning Outcome (1)**	**Learning Outcome (2)**	**Learning Outcome (3)**	**Learning Outcome (4)**	**Learning Outcome (5)**	**Weighting (%) of Assessment Element**	**Timetabled Contact Hours**
Class Test	✓	✓	✓	✓		40	2
Component 2							
Assessment Type (Footnote B.)	**Learning Outcome (1)**	**Learning Outcome (2)**	**Learning Outcome (3)**	**Learning Outcome (4)**	**Learning Outcome (5)**	**Weighting (%) of Assessment Element**	**Timetabled Contact Hours**
Coursework – Math Skills	✓	✓	✓			30	0
Component 3							
Assessment Type (Footnote B.)	**Learning Outcome (1)**	**Learning Outcome (2)**	**Learning Outcome (3)**	**Learning Outcome (4)**	**Learning Outcome (5)**	**Weighting (%) of Assessment Element**	**Timetabled Contact Hours**
Portfolio of written work	✓		✓		✓	30	0
					Combined Total for All Components	100	2