University of the West of Scotland

Module Descriptor

Session: 2024/25

Title of Module: Applications of Nuclear Physics			
Code: PHYS10012	**SCQF Level: 10 (Scottish Credit and Qualifications Framework)**	**Credit Points: 20**	**ECTS: 10 (European Credit Transfer Scheme)**
School:	School of Computing, Engineering and Physical Sciences		
Module Co-ordinator:	Michael Bowry		

Summary of Module

This is a core module at SCQF Level 10 for the Physics with Nuclear Technology programme and an optional module for the Physics programme.

The module is focused on the application of theoretical and experimental nuclear physics outside of fundamental nuclear physics. This includes (but is not limited to) nuclear energy and a variety of analytical methods, such as radiometric dating. The principal goal of this module is to illustrate the wide influence and impact of nuclear physics upon industry and society.

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					
(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 advanced concepts related to applications of nuclear physics.
L2	To be able to apply the principles of advanced concepts in nuclear physics to solve relevant problems.
L3	Understand the processes, methods and equipment used in a variety of experimental nuclear analytical techniques.

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 **10** Knowledge of the core concepts of the applications of nuclear physics. Demonstrate a critical understanding of nuclear reactors, nuclear power, and nuclear applications in industry and society. Demonstrate a critical approach towards experimental work at a high level including the use of fast modern day detection systems.
Practice: Applied Knowledge and Understanding	SCQF Level **10** Use a selection of skills, techniques, and practices applicable to employment in nuclear-related areas or enabling further study (such as MSc or PhD). Practice up-to-date literature searches of relevant topics in

	applied nuclear physics. Understanding of the concepts of the most important questions in modern-day applications of nuclear physics.	
Generic Cognitive skills	SCQF Level **10** Critical appreciation of underlying complex concepts. Problem analysis, evaluation, solving and appreciation.	
Communication, ICT and Numeracy Skills	SCQF Level **10** Use of computers for advanced studies (programming, simulation, data mining). Use of scientific database systems for literature searches. Literary skills, enabling the communication of abstract concepts in written and verbal form.	
Autonomy, Accountability and Working with others	SCQF Level **10** Individual study and retrieval of scientific literature. Working towards deadlines and accountability for scientific conduct such as referencing. Interaction with peers in discussion of subject matter	
Pre-requisites:	Before undertaking this module the student should have undertaken the following:	
	Module Code: PHYS09003 PHYS09007 PHYS09008 PHYS09011	**Module Title:** Electromagnetism Thermodynamics and Statistical Physics Quantum Mechanics Atoms & Nuclei
	Other:	or equivalent
Co-requisites	**Module Code:**	**Module Title:**

*Indicates that module descriptor is not published.

Learning and Teaching	
In line with current learning and teaching principles, a 20-credit module includes 200 learning hours, normally including a minimum of 36 contact hours and maximum of 48 contact hours.	
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	36
Independent Study	164
	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:

K. S. Krane “Introductory Nuclear Physics” Wiley (1988)

J. S. Lilley “Nuclear Physics – Principles and Applications”, Manchester Physics Series – Wiley (2001)

J. K. Shultis and R.E. Law “Fundamentals of Nuclear Science and Engineering” CRC Press (2008)

J. Wood “Nuclear Power” IET – Institute of Engineering and Technology (2007)

R.L. Murray and K.E. Holbert, “Nuclear Energy: An Introduction to the Concepts, Systems, and Applications of Nuclear Processes”, Butterworth-Heinemann, 8th Ed. (2019)

(**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	Nara Singh Bondili
External Examiner	H Boston
Accreditation Details	Institute of Physics (IoP)
Changes/Version Number	**2.0** 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)
Assessment 1 – Class Test (80%)
Assessment 2 – Written Coursework (20%)
(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					
Assessment Type (Footnote B.)	**Learning Outcome (1)**	**Learning Outcome (2)**	**Learning Outcome (3)**	**Weighting (%) of Assessment Element**	**Timetabled Contact Hours**
Exam	✔	✔	✔	80	2

Component 2					
Assessment Type (Footnote B.)	**Learning Outcome (1)**	**Learning Outcome (2)**	**Learning Outcome (3)**	**Weighting (%) of Assessment Element**	**Timetabled Contact Hours**
Portfolio of Written Work	✔	✔	✔	20	0
Combined Total for All Components				100	2