Module Descriptor

Title	Applications of Nuclear Physics		
Session	2025/26	**Status**	Published
Code	PHYS10012	**SCQF Level**	10
Credit Points	20	**ECTS (European Credit Transfer Scheme)**	10
School	**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 to a variety of fields and disciplines, including (but not limited to):

• Nuclear Energy (Fission and Fusion)

• Radiometric dating

• Nuclear Astrophysics

• Spectroscopy (e.g. Mossbauer, PIXE, PIGE, XRF)

• Nuclear analytical techniques (e.g. NAA)

The principal goal of this module is to illustrate the wide influence and impact of nuclear physics upon industry and society. This module is intended to help students achieve and maintain recognised graduate attributes as part of their academic, personal, and professional development. Some examples as given below:

• analytical examination of problems and identifying reasonable solutions, knowledge of basic concepts and data (in nuclear physics) and how these may be applied, numerical literacy, digital literacy, and independent working,

• effective communication of ideas and concepts, collaboration and group work,

• awareness of norms / conduct in professional research, knowledge of peer-review process.

Module Delivery Method	On-Campus[1] ☒	Hybrid[2] ☐	Online[3] ☐	Work -Based Learning[4] ☐
Campuses for Module Delivery	☐ Ayr ☐ Dumfries	☐ Lanarkshire ☐ London ☒ Paisley	☐ Online / Distance Learning ☐ Other (specify)	

Terms for Module Delivery	Term 1	☐	Term 2	☒	Term 3	☐
Long-thin Delivery over more than one Term	Term 1 – Term 2	☐	Term 2 – Term 3	☐	Term 3 – Term 1	☐

Learning Outcomes	
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.
L4	
L5	

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 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 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).

[1] Where contact hours are synchronous/ live and take place fully on campus. Campus-based learning is focused on providing an interactive learning experience supported by a range of digitally-enabled asynchronous learning opportunities including learning materials, resources, and opportunities provided via the virtual learning environment. On-campus contact hours will be clearly articulated to students.

[2] The module includes a combination of synchronous/ live on-campus and online learning events. These will be supported by a range of digitally-enabled asynchronous learning opportunities including learning materials, resources, and opportunities provided via the virtual learning environment. On-campus and online contact hours will be clearly articulated to students.

[3] Where all learning is solely delivered by web-based or internet-based technologies and the participants can engage in all learning activities through these means. All required contact hours will be clearly articulated to students.

[4] Learning activities where the main location for the learning experience is in the workplace. All required contact hours, whether online or on campus, will be clearly articulated to students

	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 10** Critical appreciation of underlying complex concepts. Problem analysis, evaluation, solving and appreciation.
Communication, ICT and Numeracy Skills	**SCQF 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 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

Prerequisites	**Module Code**	**Module Title**
	PHYS09003	Electromagnetism
	PHYS09008	Quantum Mechanics
	PHYS09013	Atoms, Nuclei, and Particles
	Other All applicants must satisfy the qualification and/or experience requirements as established in the admission criteria.	
Co-requisites	**Module Code**	**Module Title**

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** (Note: Learning hours include both contact hours and hours spent on other learning activities)
Lecture / Core Content Delivery	36
Laboratory / Practical Demonstration / Workshop	0
Independent Study	164
n/a	
n/a	

n/a	
TOTAL	200

Indicative Resources
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. **For the purposes of this module, academic engagement equates to the following:** The School of Computing, Engineering and Physical Sciences considers attendance and engagement to mean a commitment to attending, and engaging in, timetabled sessions. You will scan your attendance via the scanners each time you are on-campus and you will login to the VLE several times per week. Where you are unable to attend a timetabled learning session due to illness or other circumstance, you should notify the Programme Leader that you cannot attend. Across the School an 80% attendance threshold is set. If you fall below this, you will be referred to the Student Success Team to see how we can best support your studies.

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. Aligned with the University's commitment to equality and diversity, this module supports equality of opportunity for students from all backgrounds and learning needs. Using the VLE, material will be presented electronically in formats that allow flexible access and manipulation of content. This module complies with University regulations and guidance on inclusive learning and teaching practice. Specialist assistive equipment, support provision and adjustment to assessment practice in accordance with the University's policies and regulations.
(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 Physical Sciences**
Overall Assessment Results	☐ **Pass / Fail** ☒ **Graded**
Module Eligible for Compensation	☐ **Yes** ☒ **No** **If this module is eligible for compensation, there may be cases where compensation is not permitted due to programme accreditation requirements. Please check the associated programme specification for details.**
School Assessment Board	Mathematics and Physics
Moderator	D. O'Donnell
External Examiner	TBC
Accreditation Details	Institute of Physics (IoP)
Module Appears in CPD catalogue	☐ **Yes** ☒ **No**
Changes / Version Number	3.0 25/26 edition Modified pre-requsities

Assessment (also refer to Assessment Outcomes Grids below)
Assessment 1
Class Test (80%)
Assessment 2
Coursework: Problem Sets (20%)
Assessment 3
n/a
(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.)

Component 1							
Assessment Type	**LO1**	**LO2**	**LO3**	**LO4**	**LO5**	**Weighting of Assessment Element (%)**	**Timetabled Contact Hours**
Class Test	☒	☒	☒	☐	☐	80	2

Component 2							
Assessment Type	**LO1**	**LO2**	**LO3**	**LO4**	**LO5**	**Weighting of Assessment Element (%)**	**Timetabled Contact Hours**
Coursework	☒	☒	☒	☐	☐	20	0

Component 3

Assessment Type	LO1	LO2	LO3	LO4	LO5	Weighting of Assessment Element (%)	Timetabled Contact Hours
n/a	☐	☐	☐	☐	☐		
Combined total for all components						100%	2 hours

Change Control

What	When	Who
Moved to new template	18/03/2025	M. Bowry
Pre-requisites updated	18/03/2025	M. Bowry