Module Descriptor

Title	Detectors and Nuclear Lab Skills		
Session	2025/26	**Status**	Published
Code	PHYS09014	**SCQF Level**	9
Credit Points	20	**ECTS (European Credit Transfer Scheme)**	10
School	**Computing, Engineering and Physical Sciences**		
Module Co-ordinator	Nara Singh Bondili		

Summary of Module

This is a core SCQF Level 9 module for Physics with Nuclear Technology Programme and an optional module for Physics Programme.

The module focuses on radiation and detection. The lecture material has a strong connection to laboratory sessions on nuclear laboratory skills. The module is also strongly connected to nuclear applications that impact societal needs, for example, security, energy and health needs.

Detectors and Nuclear Lab Skills will include interaction of charged particles with matter, X-ray, particle detectors, neutrons, gas-filled detectors; scintillation detectors; semiconductor detectors; gamma-ray spectroscopy and trace element analysis.

The module has nuclear measurements which will include laboratory sessions of radiation detection with semiconductor and scintillator particle detectors, and semiconductor and scintillator gamma-ray detectors.

This module would additionally be of interest to students in analytical disciplines in chemistry and biological sciences, as well as physics, providing the student had sufficient understanding of the physical principles involved.

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	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	Apply critical understanding to the use of physical techniques in analysis, characterisation, and sensing and detection.
L2	Work with their knowledge of the principal techniques and their application to solve problems in any of the topic areas.
L3	Demonstrate a specialist understanding in at least one area of analysis, characterisation, sensing or detection.
L4	Demonstrate a specialist understanding of how the detection techniques can be applied to nuclear research.
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 9** The student will demonstrate a critical understanding of the scope and defining features of detectors and nuclear skills, and an integrated knowledge of its main areas and boundaries. The student will demonstrate a critical understanding of the physics and practical knowledge of detection and nuclear techniques, and their applications to energy and health sectors and trace elemental analysis.

[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: Applied Knowledge and Understanding	**SCQF 9** The student will apply knowledge, skills and understanding in the following areas. Subject knowledge will be applied during the production of assessed work, and in the laboratory and class discussions. A range of calculation and analysis techniques will be used during the production of assessed work and independent study. Laboratory sessions will include the use of some specialist equipment and advanced techniques. Students will also have to use routine research and enquiry techniques to find information on some topics, and to provide background material for assessed work.
Generic Cognitive skills	**SCQF 9** Students will undertake critical analysis, evaluation, and synthesis of ideas, concepts and information during independent study and during production of assessed work. In exams, problems sessions, and labs, students will identify and analyse routine problems characteristic of physics at Level 9. Students will show an ability to select appropriate analysis techniques, and ability to select information as appropriate from reference materials and draw on a range of materials in making judgments.
Communication, ICT and Numeracy Skills	**SCQF 9** The student will use a wide range of routine communication, ICT and numeracy skills such as the production of written work, the use of spreadsheets, and use of computers for data collection. Numerical and graphical data will be produced, interpreted and evaluated in labs and in problem sessions. Advanced specialist skills will be demonstrated in writing a formal report, and using a laboratory notebook to record experimental results and procedures. Presentation of information on mainstream module topics will take the form of PowerPoint slides, formal lab reports, class discussions, and in small groups. Audiences may or may not have previous knowledge of the subject.
Autonomy, Accountability and Working with Others	**SCQF 9** Students will have autonomy in managing their own work during independent study and revision. They will need to exercise some initiative in interpreting the most relevant material to work on. Working in pairs and small group, students will need to use awareness of their own and others' responsibilities. In particular in labs and on any visits students will interact with physics technical staff, researchers, and engineers.

Prerequisites	Module Code	Module Title
	PHYS08002	Optics & Electronics
	PHYS08004	Properties of Matter
	PHYS08006	Mathematics for Physics 1
	PHYS08007	Classical Mechanics
	PHYS08009	Modern Physics
	Other or equivalent	
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	24
Tutorial / Synchronous Support Activity	12
Laboratory / Practical Demonstration / Workshop	12
Independent Study	152
Please select	
Please select	
TOTAL	200

Indicative Resources
The following materials form essential underpinning for the module content and ultimately for the learning outcomes: G. F. Knoll "Radiation detection and measurement" Third Edition, Wiley (2000) W. R. Leo "Techniques for Nuclear and Particle Physics Experiments" Springer-Verlag (1994) L. Lyons "Statistics for Nuclear and Particle Physics" Cambridge University Press (1986) K.S. Krane, "Introductory Nuclear Physics" JOHN WlLEY & SONS (1988)

In addition, it will be necessary for students to consult the internet, “trade magazines” and published literature in order to complete their individual study and assignments. Nuclear Physics research journals such as Nuclear Instruments and Methods, Physical Review C, Physical Review Letters, Nature, and Nuclear Physics A.
(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. This module has lab-based teaching and as such you are advised to speak to the Module Co-ordinator to ensure that specialist assistive equipment, support provision and adjustment to assessment practice can be put in place, 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	M. Bowry

External Examiner	TBC
Accreditation Details	Institute of Physics (IoP)
Module Appears in CPD catalogue	☐ **Yes** ☒ **No**
Changes / Version Number	2.0 Module descriptor amended to conform to the new template format

Assessment (also refer to Assessment Outcomes Grids below)
Assessment 1
Class Test (60%)
Assessment 2
Coursework: Problem Sets and Laboratory Work (40%)
Assessment 3
(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	☒	☒	☒	☒	☐	60	2

Component 2							
Assessment Type	**LO1**	**LO2**	**LO3**	**LO4**	**LO5**	**Weighting of Assessment Element (%)**	**Timetabled Contact Hours**
Coursework	☒	☒	☒	☒	☐	40	12

Component 3							
Assessment Type	**LO1**	**LO2**	**LO3**	**LO4**	**LO5**	**Weighting of Assessment Element (%)**	**Timetabled Contact Hours**
	☐	☐	☐	☐	☐		
Combined total for all components						100%	14 hours

Change Control

What	**When**	**Who**
Moved to new template	26/03/2025	Nara Singh Bondili
