University of the West of Scotland

Module Descriptor

Session: 2024/25

Title of Module: Optical System Design			
Code: PHYS10014	**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:	Yang Chen		

Summary of Module

This is an optional module at SCQF Level 10 for the Physics programme.

This module will introduce students to basic working principles of optical system designs and their applications in engineering. The module includes theoretical background for optical design and pragmatic considerations for building an optical system. These include: optical system specifications, material selection, use of catalogue systems and components, analysis of optical systems, environmental factors and solutions as well as production details. Practical and useful examples with rigorous optical design and engineering will also be demonstrated during this module. The module delivery will be supported by using Zemax software to underline student understanding.

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	Demonstrate understanding of fundamental physics and engineering related to optical system design.
L2	Develop a complete optical system specification and design a system for real applications.
L3	Establish a general basis for modelling optical systems using computer-aided methods.
L4	Capability to use commercial software Zemax for future work.

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 core concepts of optics. Critical understanding of optical methods. Critical approach towards optical design work at a high level.
Practice: Applied Knowledge and Understanding	SCQF Level **10** Use of a selection of skills, techniques and practices applicable to work in the field of optics systems and enabling further studies (MSc, PhD). Practice of up-to-date literature search / industrial application for the hot topics in optical system design.

Generic Cognitive skills	SCQF Level **10** Presenting and evaluating arguments, information and ideas in physics. Using a range of approaches to addressing problems and issues in physics.	
Communication, ICT and Numeracy Skills	SCQF Level **10** Literary skills, enabling the communication of abstract concepts in written and verbal forms. Good skills in optical design software.	
Autonomy, Accountability and Working with others	SCQF Level **10** Taking responsibility for individual studying and retrieval of scientific literature. Presenting results from self-study in front of peers.	
Pre-requisites:	Before undertaking this module the student should have undertaken the following:	
	Module Code: PHYS09001 PHYS09003 PHYS09008 PHYS09011	**Module Title:** Advanced Optics Electromagnetism 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	24
Tutorial/Synchronous Support Activity	12
Laboratory/Practical Demonstration/Workshop	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: Robert F. Fischer, Optical System Design, Second Edition, McGraw-Hill Education, 2008 Joseph M Geary, Introduction to Lens Design with Practical Zemax Examples, Willmann-Bell Inc., 2002 Chris Velzel, A Course in Lens Design, Springer, 2014
(**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	Shigeng Song

External Examiner	H Boston
Accreditation Details	Institute of Physics
Changes/Version Number	**1.0** This is a new module, running for the first time in 2024/25.

Assessment: (also refer to Assessment Outcomes Grids below)
Assessment 1 – Exam (80%)
Assessment 2 – Written Coursework and Laboratory Work (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)**	**Learning Outcome (4)**	**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)**	**Learning Outcome (4)**	**Weighting (%) of Assessment Element**	**Timetabled Contact Hours**
Portfolio of Written Work	✔	✔	✔		10	0
Laboratory	✔	✔	✔	✔	10	12
Combined Total for All Components					100	14