Imperial College London

Module Specification (Curriculum Review)

Basic details

			Earliest cohort	Latest cohort
UID		Cohorts covered	2024-25	
Long title	Optical Measurement and Devices			
New code	PHYS70026	New short title		
Brief description of module *(approx. 600 chars.)*	Optical measurement techniques are important to manufacturers and users of optical equipment and in a wide range of applications. Polarisation, interference and coherence are aspects of light that can be exploited for a broad range of measurement techniques and form the foundation of many optical devices. This module introduces these phenomena and provides frameworks for describing, understanding and exploiting them. The module gives details of the underlying generic optical concepts, their mathematical representation and their practical applications.			
	557 characters			
Available as a standalone module/ short course?	N			

Statutory details

	ECTS	CATS	Non-credit		
Credit value	5	10	N	HECOS codes	
FHEQ level	Level 7				

Allocation of study hours

	Hours	
Lectures	16	
Group teaching	8	*Incl. seminars, tutorials, problem classes.*
Lab/ practical	0	
Other scheduled	10	*Incl. project supervision, fieldwork, external visits.*
Independent study	91	*Incl. wider reading/ practice, follow-up work, completion of assessments, revisions.*
Placement	0	*Incl. work-based learning and study that occurs overseas.*
Total hours	125	
ECTS ratio	25.00	

Project/placement activity

Is placement activity allowed?	No

Module delivery

Delivery mode	Taught/ Campus	Other	
Delivery term	Term 1	Other	

Ownership

Primary department	Department of Physics
Additional teaching departments	
Delivery campus	South Kensington

Collaborative delivery

Collaborative delivery?	N

External institution	N/A
External department	N/A
External campus	N/A

Associated staff

Role	CID	Given name	Surname
Module Leader		Kenneth	Weir
Lecturer		Carl	Paterson

Learning and teaching

Module description

Learning outcomes	On completion of this module you will be able to: - determine the mathematical representation of polarisation state of light as a vector expression, as a Jones Vector or via Stokes parameters and relate these to the azimuth and ellipticity of the light; - explain the concept of interference of light and use mathematical representations to describe interference, analyse results and use it in optical measurements - determine the relationship between the temporal and spectral coherence of light and the light's properties, explain their interpretation and their implications for interference measurements; - critically assess the performance of a range of interferometry methods and their applications in optical testing and measurements, select appropriate methods and analyse the corresponding results - develop a framework for the design and analysis of the performance of thin-film coatings for different real-world applications.
Module content	Light as a wave; definition of the polarisation state of light; vector, Stokes' parameters and Jones vector representation of polarisation; devices for the manipulation of polarisation and their Jones matrices and Mueller matrices; measurement of polarisation. Principles of interferometry; division of wavefront and division of amplitude; two-beam and multiple beam interferometry; coherence including spatial and temporal coherence; practical interferometers. Interferometric and non-interferometric techniques for testing the quality of optical surfaces, optical components and wavefront measurement. Optical properties of thin films; design of thin film antireflection coatings, and high reflection coatings; narrow band optical interference filters; practical techniques for the manufacture of thin film devices.
Learning and Teaching Approach	Lectures and classworks (where a timetabled session is used for a group problem solving exercise) supported by problem sheets. Unassessed problem sheets will be issued to give practice in applying the concepts introduced in the module.
Assessment Strategy	A 2 hour written examination provides 100% summative assessment. Examination questions are designed to assess across all of the learning outcomes. Formative assessment is provided through the problem sheets and classworks.
Feedback	Problem sheets are provided and model solutions are provided. An office hour is provided each week during the module to allow for feedback and direct interaction between students and lecturers. Classworks provide an opportunity for group discussion and for students to receive feedback on the classwork exercises.
Reading list	Principles of Optics, by M Born and E Wolf, 6th edition 1980 Basics of Interferometry, by P Hariharan, 1992 Thin Film Optical Filters by H A MacLeod, 3rd edition 2001.

Quality assurance

Date of first approval	
Date of last revision	
Date of this approval	

Office use only

QA Lead	
Department staff	
Date of collection	

Module leader	Kenneth Weir	Date exported	
		Date imported	

Notes/ comments

Template version 16/06/2017