

Basic details

UID	<input type="text"/>	Cohorts covered	Earliest cohort <input type="text" value="2025-26"/>
Long title	<input type="text" value="Imaging"/>		
New code	<input type="text" value="PHYS70024"/>	New short title	<input type="text"/>
Brief description of module (approx. 600 chars.)	<input type="text" value="The Imaging module is split into two parts: geometrical optics and wave optics. Geometrical optics introduces you to the ray model for light propagation through optical systems and methods to model light propagation. The wave optics part introduces methods to model the propagation of scalar waves through optical systems. Geometrical optics can be used to describe image formation for both coherent and incoherent illumination."/>		
Available as a standalone module/ short course?	<input type="text" value="N"/>		

Statutory details

	ECTS	CATS	Non-credit	HECOS codes
Credit value	<input type="text" value="5"/>	<input type="text" value="10"/>	<input type="text" value="N"/>	
FHEQ level	<input type="text" value="Level 7"/>			

Allocation of study hours

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

Project/placement activity

Is placement activity allowed?	<input type="text" value="No"/>
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Module delivery

Delivery mode	<input type="text" value="Taught/ Campus"/>	Other	<input type="text"/>
Delivery term	<input type="text" value="Term 1"/>	Other	<input type="text"/>

Ownership

Primary department	<input type="text" value="Physics"/>
Additional teaching departments	<input type="text"/> <input type="text"/> <input type="text"/>
Delivery campus	<input type="text" value="South Kensington"/>

Collaborative delivery

Collaborative delivery? **N**

External institution
External department
External campus

N/A
N/A
N/A

Associated staff

Role	CID	Given name	Surname
Module Leader		Chris	Dunsby
Lecturer		James	McGinty

Learning and teaching

Module description

Learning outcomes	<p>On completion of this module students will be able to</p> <ul style="list-style-type: none"> - apply the refraction invariant, aperture and field stops and the Lagrange invariant in calc systems - evaluate wave and transverse ray aberrations, use the aberration polynomial and charac terms of the primary aberrations - calculate wavefront aberrations in optical systems using Seidel sums and perform assoc - derive and describe the field distribution in the vicinity of the back focal plane of a perfe coherent illumination and its relationship to the Fourier transform - use the point spread function and coherent transfer function analyse to calculate the pe coherent imaging systems - use the point spread function and optical/modulation transfer function to analyse and ca performance of incoherent imaging systems
Module content	<p>Geometrical optics:</p> <p>Ideal optical systems, cardinal points, lateral and longitudinal magnification, paraxial appro lens formula, single refracting surface, refraction invariant, aperture and field stops, Lagr systems, Gaussian properties of two systems, ABCD ray tracing matrices, wave and tran aberrations, the aberration polynomial, primary aberrations, Seidel sums and Seidel sums</p> <p>Wave optics:</p> <p>Scalar diffraction theory, angular spectrum of plane waves, first Rayleigh-Sommerfeld inte Fraunhofer diffraction integrals, transmission function and field distribution in back focal p lens, application of Fourier transform to diffraction calculations, weak aberration and the S imaging of point and extended object, coherent transfer function and coherent point sprea from coherent to incoherent imaging, optical/modulation transfer function and incoherent p</p>
Learning and Teaching Approach	<p>Students will be taught through a combination of lectures and classworks (where a timetal for a group problem solving exercise) supported by problem sheets and office hours. Som be delivered by assigning the students pre-recorded content to study, with subsequent in- used to reinforce that material.</p>
Assessment Strategy	<p>A 2 hour written examination provides 100% summative assessment. Examination questio assess across all of the learning outcomes.</p> <p>Formative assessment is provided through the problem sheets and classworks.</p>
Feedback	<p>Problem sheets are provided and model solutions are provided. An office hour is provide the module to allow for feedback and direct interaction between students and the module l provide an opportunity for group discussion and for students to receive feedback on the c For material that is delivered using pre-recorded content, the in-person sessions allow stu module material with the lecturer in small groups.</p>

Reading list	E. Hecht, "Optics", Addison Wesley, 4 th Edition, 2002
	M. Born and E. Wolf, "Principles of Optics", Cambridge, 7 th Edition, 1999
	W. T. Welford, "Aberrations of Optical Systems", Taylor and Francis, 1996
	J. W. Goodman, "Introduciton to Fourier Optics", Roberts and Company, 3 rd Edition, 2005
	J. Mertz, "Introduciton to Optical Microscopy", Roberts and Company, 2010

Quality assurance

Office use only

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

QA Lead	
Department staff	
Date of collection	

Module leader Chris Dunsby

Date exported	
Date imported	

Notes/ comments	
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Template version

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Latest cohort

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415 characters

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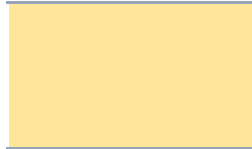
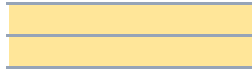
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16/06/2017