Imperial College London

Module Specification (Curriculum Review)

Basic details

			Earliest cohort	Latest cohort
UID		Cohorts covered	2024-25	

Long title	Solid State Physics
New code	PHYS60003
New short title	Solid State Physics

Brief description of module *(approx. 600 chars.)*

This course covers the fundamentals of the physics of solids. We will explore how the properties of solids are determined by microscopic physics. There will be focus on electronic properties of insulators, semiconductors and metals.

233 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 6

Allocation of study hours

	Hours	
Lectures	22	
Group teaching	6	*Incl. seminars, tutorials, problem classes.*
Lab/ practical	0	
Other scheduled	11	*Incl. project supervision, fieldwork, external visits.*
Independent study	86	*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		Other	Term 1, exam in term 3

Ownership

Primary department: Physics

Additional teaching departments	None
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		Rupert	Oulton

Learning and teaching

Module description

Learning outcomes	On completion of this module you will be able to: - explain and apply the band theory picture of electrons in solids - distinguish between an insulator, metal or semiconductor - describe electrical conduction in metals - explain the basic electronic properties of a semiconductor
Module content	- Reciprocal lattice and Brillouin zones - Bloch's theorem and electron bands: nearly free electron model and tight-binding models - Fermi surfaces of a metal - Electrical conduction: Drude theory, drift and diffusion - Valence and conduction bands in a semiconductor - Intrinsic and extrinsic semiconductors - pn junction
Learning and Teaching Approach	Students will be taught over a term using a combination of lectures, office hours and directed exercises on theoretical work.
Assessment Strategy	An exam covering all learning outcomes will comprise the main part of the summative assessment and will comprise 80% of the module mark. In-course assessments comprising online tests and handwritten problems will comprise 20% of the mark.
Feedback	Problem sheets are provided weekly (8 in total) with questions and examples students can practise with. There will be tutorial questions discussed with, and marked by, the tutors or their teaching assistants and students will receive feedback from those.

Reading list	No additional books are required to be purchased by the students. Further discussion of material covered by the course, along with relevant problems can be found in: • S. H. Simon, The Oxford Solid State Basics. (OUP, 2013) • J. R. Hook and H. E. Hall, Solid State Physics. (Wiley-Blackwell, 1991) • C. Kittel, Introduction to Solid State Physics 8th edition, John Wiley & Sons, 2004)

Quality assurance

Date of first approval	
Date of last revision	
Date of this approval	
Module leader	Rupert Oulton
Notes/ comments	

Office use only

QA Lead	
Department staff	
Date of collection	
Date exported	
Date imported	

Template version 16/06/2017

Programme structure

Associated modules

UID	Legacy code	Module title	Requisite type

Assessment details

Grading method	Numeric	Pass mark	40%

Assessments

Assessment type	Assessment description	Weighting	Pass mark	Must pass?
Examination	2-hour written exam	80%	40%	N
Coursework	In-course assessment	20%	40%	N