## Basic details

<table>
<thead>
<tr>
<th>UID</th>
<th>Cohorts covered</th>
<th>Earliest cohort</th>
<th>Latest cohort</th>
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<tbody>
<tr>
<td></td>
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<td>2021-22</td>
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</table>

**Long title**
Solid State Physics

**New code**
PHYS60003

**New short title**
Solid State Physics

**Brief description of module**
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.

**Available as a standalone module/ short course?**
N

## Statutory details

<table>
<thead>
<tr>
<th>Credit value</th>
<th>ECTS</th>
<th>CATS</th>
<th>Non-credit</th>
<th>HECOS codes</th>
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<tr>
<td></td>
<td>5</td>
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</table>

**FHEQ level**
Level 6

## Allocation of study hours

<table>
<thead>
<tr>
<th>Hours</th>
<th>Lectures</th>
<th>Group teaching</th>
<th>Lab/ practical</th>
<th>Other scheduled</th>
<th>Independent study</th>
<th>Placement</th>
<th>Total hours</th>
<th>ECTS ratio</th>
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<tbody>
<tr>
<td></td>
<td>22</td>
<td>6</td>
<td>0</td>
<td>11</td>
<td>86</td>
<td>0</td>
<td>125</td>
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</table>

*Incl. seminars, tutorials, problem classes.*

*Incl. project supervision, fieldwork, external visits.*

*Incl. wider reading/practice, follow-up work, completion of assessments, revisions.*

*Incl. work-based learning and study that occurs overseas.*

## Project/placement activity

**Is placement activity allowed?**
No

## Module delivery

**Delivery mode**
Taught/ Campus

**Delivery term**
Term 1, exam in term 3

## Ownership

**Primary department**
Physics

**Additional**
None
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 75% of the module mark. In-course assessments comprising online tests and handwritten problems will comprise 25% 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:
Date of this approval
Date of collection

Module leader: Rupert Oulton

Date exported
Date imported

Notes/ comments

Template version 16/06/2017
## Programme structure

### Associated modules

<table>
<thead>
<tr>
<th>UID</th>
<th>Legacy code</th>
<th>Module title</th>
<th>Requisite type</th>
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<tr>
<td>UID</td>
<td>Legacy code</td>
<td>Programme title</td>
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### Assessment details

<table>
<thead>
<tr>
<th>Grading method</th>
<th>Pass mark</th>
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<tbody>
<tr>
<td>Numeric</td>
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### Assessments

<table>
<thead>
<tr>
<th>Assessment type</th>
<th>Assessment description</th>
<th>Weighting</th>
<th>Pass mark</th>
<th>Must pass?</th>
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<tbody>
<tr>
<td>Examination</td>
<td>2-hour written exam</td>
<td>75%</td>
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<tr>
<td>Coursework</td>
<td>In-course assessment</td>
<td>25%</td>
<td>40%</td>
<td>N</td>
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