MSci Physics

This document provides a definitive record of the main features of the programme and the learning outcomes that a typical student may reasonably be expected to achieve and demonstrate if s/he takes full advantage of the learning opportunities provided. This programme specification is intended as a reference point for prospective students, current students, external examiners and academic and support staff involved in delivering the programme and enabling student development and achievement.

**Programme Information**

<table>
<thead>
<tr>
<th>Programme Title</th>
<th>Physics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Award(s)</td>
<td>MSci</td>
</tr>
<tr>
<td>Associateship</td>
<td>Royal College of Science</td>
</tr>
<tr>
<td>Programme code</td>
<td>F303</td>
</tr>
<tr>
<td>Awarding Institution</td>
<td>Imperial College London</td>
</tr>
<tr>
<td>Teaching Institution</td>
<td>Imperial College London</td>
</tr>
<tr>
<td>Faculty</td>
<td>Faculty of Natural Sciences</td>
</tr>
<tr>
<td>Department</td>
<td>Department of Physics</td>
</tr>
<tr>
<td>Main Location of Study</td>
<td>South Kensington Campus</td>
</tr>
<tr>
<td>Mode and Period of Study</td>
<td>4 academic years full-time</td>
</tr>
<tr>
<td>Cohort Entry Points</td>
<td>Annually in October</td>
</tr>
<tr>
<td>Relevant QAA Benchmark Statement(s) and/or other external reference points</td>
<td>Physics, Astronomy and Astrophysics, The Physics Degree (Institute of Physics)</td>
</tr>
<tr>
<td>Total Credits</td>
<td>ECTS: 240, CATS: 480</td>
</tr>
<tr>
<td>FHEQ Level</td>
<td>Level 7</td>
</tr>
<tr>
<td>EHEA Level</td>
<td>2nd cycle</td>
</tr>
<tr>
<td>External Accradiator(s)</td>
<td>Institute of Physics (IOP)</td>
</tr>
<tr>
<td></td>
<td>Accreditation received: 2015</td>
</tr>
<tr>
<td></td>
<td>Accreditation renewal: 2020</td>
</tr>
</tbody>
</table>

**Specification Details**

<table>
<thead>
<tr>
<th>Student cohorts covered by specification</th>
<th>2017/18 entry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Person responsible for the specification</td>
<td>Dr Robert Forsyth (DUGS)</td>
</tr>
<tr>
<td>Date of introduction of programme</td>
<td>2012-13 (date of last review)</td>
</tr>
</tbody>
</table>
### Programme Overview

The Physics degree programmes cover a common core over the first two years, including Mathematics, Mechanics, Vibrations & Waves, Electricity & Magnetism, Optics, Thermodynamics & Statistical Physics, Relativity, Quantum Physics, Atomic, Nuclear & Particle Physics, Solid State Physics, and laboratory work. A wide range of elective modules are available in Years 3 and 4 of the MSci programme allowing students to receive a broad physics education or specialise in particular areas of physics up to Masters level standard (FHEQ Level 7). A substantial final year project is undertaken in association with one of the Department’s research groups. The programme aims to prepare students for the transition to postgraduate study in physics or a career as a professional physicist.

### Learning Outcomes

The Imperial Graduate Attributes are a set of core competencies which we expect students to achieve through completion of any Imperial College degree programme. The Graduate Attributes are available at: [www.imperial.ac.uk/students/academic-support/graduate-attributes](http://www.imperial.ac.uk/students/academic-support/graduate-attributes)

#### Knowledge and Understanding of:

- The fundamentals, which all students need to cover, including electromagnetism, optics, quantum and classical mechanics, relativity, statistical physics and thermodynamics, wave phenomena and the properties of matter.
- The application of the fundamental principles to particular areas. These include nuclear and particle physics, condensed matter physics and atomic structure.
- A few subjects which students study in greater depth and appreciate current developments at the frontiers of the subject.

#### Intellectual Skills

- Formulate and tackle problems in physics, including the identification of appropriate physical principles and the use of special and limiting cases and order-of-magnitude estimates, to arrive at a solution which is presented with an explicit statement of assumptions and approximations.
- Use mathematics to describe the physical world, selecting appropriate equations, constructing models, interpreting mathematical results and critically comparing them with experiment and observation.
- Participate, under supervision, in an extended physics investigation.

#### Practical Skills

- Plan, execute and report the results of a complex extended experiment or investigation, using appropriate methods to analyse data and to evaluate the level of its uncertainty.
- Use appropriate software such as programming languages and packages in a physics investigation.

#### Transferable Skills

- Solve open-ended problems and problems with well-defined solutions by formulating problems in precise terms, identifying key issues and trying different approaches in order to make progress.
- Carry out an independent investigation using textbooks and other available literature,
- searching databases and interacting with colleagues and staff to extract important information.
- Communicate effectively by listening carefully and presenting complex information in a clear and concise manner orally, on paper and using ICT.
- Use analytical skills, paying attention to detail and using technical language correctly, to manipulate precise and intricate ideas, and to construct logical arguments.
- Use ICT skills for communication and analysis.
- Work independently, use their initiative, meet deadlines, plan and execute a project.
- Work in groups, interacting constructively with others.

### Entry Requirements

<table>
<thead>
<tr>
<th>Academic Requirement</th>
<th>Grade Requirement</th>
<th>Normally a minimum of A<em>A</em>A overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject Requirements</td>
<td>A* in Mathematics</td>
<td></td>
</tr>
<tr>
<td></td>
<td>A in Physics</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(or a comparable qualification recognised by the College).</td>
<td></td>
</tr>
<tr>
<td>Excluded Subjects</td>
<td>General Studies and Critical Thinking are not accepted.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>International Baccalaureate (IB)</th>
<th>Grade Requirement</th>
<th>Minimum 39 points overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject Requirements</td>
<td>7, 6, 6 at higher level which must include Mathematics and Physics (or a comparable qualification recognised by the College).</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>English Language Requirement</th>
<th>Standard requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>IELTS score of 6.5 overall (minimum 6.0 in all elements)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Admissions Tests</th>
<th>Candidates may be asked to undertake an admissions test set by the College in order to provide additional information for the Admissions Tutor in support of an application.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interview</td>
<td>Yes</td>
</tr>
</tbody>
</table>

The programme’s competency standards documents can be found at: [https://www.imperial.ac.uk/natural-sciences/departments/physics/students/current-students/student-welfare/](https://www.imperial.ac.uk/natural-sciences/departments/physics/students/current-students/student-welfare/)

### Learning & Teaching Strategy

<table>
<thead>
<tr>
<th>Scheduled Learning &amp; Teaching Methods</th>
<th>Lectures</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Tutorials</td>
</tr>
<tr>
<td></td>
<td>Laboratory Classes</td>
</tr>
<tr>
<td></td>
<td>Computing Labs</td>
</tr>
<tr>
<td></td>
<td>Office hours</td>
</tr>
</tbody>
</table>
### E-learning & Blended Learning Methods
- Support of lecture courses through online course materials and lecture recordings

### Project and Placement Learning Methods
- Group and individual project work

### Assessment Strategy

<table>
<thead>
<tr>
<th>Assessment Methods</th>
<th>Written Examination</th>
<th>Assessed problem sheets</th>
<th>Laboratory notebook</th>
<th>Laboratory and project reports</th>
<th>Scientific Article</th>
<th>Interview</th>
<th>Group and individual presentations</th>
</tr>
</thead>
</table>

### Academic Feedback Policy
- All students receive feedback on their progress from their academic tutor in weekly tutorials.
- Assessed coursework in Years 1 and 2 is returned to students with comments within approximately one week of submission. Students may discuss their marks with their academic tutor if they wish.
- Laboratory and computing reports are returned to students normally within 10 days of submission and students have the opportunity of discussing their report with the marker if they wish. Heads of Laboratories are responsible for ensuring that feedback is prompt and effective.
- Students are encouraged to discuss their examination performance with their Personal Tutor.

### Re-sit Policy

### Mitigating Circumstances Policy

### Programme Structure

<table>
<thead>
<tr>
<th>Year One</th>
<th>Pre-session</th>
<th>Term One</th>
<th>Term Two</th>
<th>Term Three</th>
<th>Term Four</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core Modules</td>
<td>0</td>
<td>3.5</td>
<td>3.85</td>
<td>0.65</td>
<td>0</td>
</tr>
<tr>
<td>Elective Modules</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Projects</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
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</table>

<table>
<thead>
<tr>
<th>Year Two</th>
<th>Pre-session</th>
<th>Term One</th>
<th>Term Two</th>
<th>Term Three</th>
<th>Term Four</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Core Modules

<table>
<thead>
<tr>
<th>Year Three</th>
<th>Pre-Session</th>
<th>Term One</th>
<th>Term Two</th>
<th>Term Three</th>
<th>Term Four</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core Modules (typical(^1))</td>
<td>0</td>
<td>2.5</td>
<td>3.5</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Elective Modules (typical(^2))</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Projects (typical(^3))</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
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</tbody>
</table>

### Year Four

<table>
<thead>
<tr>
<th>Year Three</th>
<th>Pre-Session</th>
<th>Term One</th>
<th>Term Two</th>
<th>Term Three</th>
<th>Term Four</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core Modules (typical(^4))</td>
<td>0</td>
<td>0.8</td>
<td>0.2</td>
<td>0</td>
<td>0</td>
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<tr>
<td>Elective Modules (typical(^5))</td>
<td>0</td>
<td>2</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Projects</td>
<td>0</td>
<td>0.5</td>
<td>0.5</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

#### Assessment Dates & Deadlines

<table>
<thead>
<tr>
<th>Year One</th>
<th>Year Two</th>
</tr>
</thead>
<tbody>
<tr>
<td>Written Examinations</td>
<td>Written Examinations</td>
</tr>
<tr>
<td>May and June</td>
<td>May and June</td>
</tr>
<tr>
<td>Coursework Assessments</td>
<td>Coursework Assessments</td>
</tr>
<tr>
<td>Continuous</td>
<td>Continuous</td>
</tr>
<tr>
<td>Project Deadlines</td>
<td>Project Deadlines</td>
</tr>
<tr>
<td>June</td>
<td>None</td>
</tr>
<tr>
<td>Practical Assessments</td>
<td>Practical Assessments</td>
</tr>
<tr>
<td>Continuous</td>
<td>Continuous</td>
</tr>
</tbody>
</table>

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1. Students have a choice to take Lab either term 1 or term 2. Professional Skills is either taken in term 1 or term 2 depending on which term Lab is taken.
2. Students must take between 24-27 ECTS of electives in their third year. We advise students to balance their work over two terms, but there is flexibility.
3. Projects are optional in Year 3 for F303 students.
4. Research Interfaces is the only core course in Year 4.
5. Students must take 30 ECTS of electives on their fourth year.
### Year Three

<table>
<thead>
<tr>
<th>Written Examinations</th>
<th>January (elective), May and June (core and electives)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coursework Assessments</td>
<td>Continuous</td>
</tr>
<tr>
<td>Project Deadlines</td>
<td>As an elective - Term 1 project: January. Term 2 project: May</td>
</tr>
<tr>
<td>Practical Assessments</td>
<td>Continuous</td>
</tr>
</tbody>
</table>

### Year Four

<table>
<thead>
<tr>
<th>Written Examinations</th>
<th>May and June</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coursework Assessments</td>
<td>Continuous</td>
</tr>
<tr>
<td>Project Deadlines</td>
<td>May</td>
</tr>
<tr>
<td>Practical Assessments</td>
<td>Continuous</td>
</tr>
</tbody>
</table>

### Assessment Structure

- **Marking Scheme**

### Year One

A student must:
- Achieve an aggregate mark of at least 40% in each element
- Achieve a mark of 65% in Year 1 Maths to take Mathematical Methods in Year 2

### Year Two

A student must:
- Achieve an aggregate mark of at least 40% in each element
- Achieve an overall average mark of at least 60% to progress to Year 3 of the MSci programme, otherwise a transfer into Year 3 of the BSc (F300) programme is required

### Year Three

A student must:
- Achieve an aggregate mark of at least 40% in each element

### Year Four

A student must:
- Achieve an aggregate mark of at least 50% in each element

### Final Degree Classifications

- **Third** – a student must achieve an aggregate mark of 40%
- **Lower Second** – a student must achieve an aggregate mark of 50%
Upper Second – a student must achieve an aggregate mark of 60%
First - a student must achieve an aggregate mark of 70%

Candidates who fall no more than 2.5% below the minimum mark for a higher honours classification shall be eligible for review of their final classification. This review will be at the discretion of the Board of Examiners and will allow promotion into the higher class for students who have achieved the higher class in 50% or more of the total credits awarded for the programme weighted by year.
<table>
<thead>
<tr>
<th>Year</th>
<th>% Year Weighting</th>
<th>Module</th>
<th>Term(s)</th>
<th>ECTS</th>
<th>% Module Weighting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year One</td>
<td>7.69%</td>
<td>Mathematics</td>
<td>1 &amp; 2</td>
<td>15</td>
<td>25%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Measurement and Uncertainty</td>
<td>1</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mechanics, Vibrations &amp; Waves</td>
<td>1</td>
<td>8</td>
<td>13.33%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Electricity &amp; Magnetism, Relativity</td>
<td>2 &amp; 3</td>
<td>7.5</td>
<td>12.5%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Quantum Physics and Structure of Matter</td>
<td>2 &amp; 3</td>
<td>7.5</td>
<td>12.5%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Advanced Electronics</td>
<td>2</td>
<td>4</td>
<td>6.67%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Laboratory and Computing I</td>
<td>1 &amp; 2</td>
<td>9</td>
<td>15%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Professional Skills and Basic Electronics I</td>
<td>1 &amp; 2</td>
<td>5</td>
<td>8.33%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Project</td>
<td>3</td>
<td>4</td>
<td>6.67%</td>
</tr>
<tr>
<td>Year Two</td>
<td>23.08%</td>
<td>Atomic, Nuclear and Particle Physics</td>
<td>2 &amp; 3</td>
<td>6</td>
<td>10%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Electromagnetism and Optics</td>
<td>2 &amp; 3</td>
<td>9</td>
<td>15%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Professional Skills II</td>
<td>1</td>
<td>2</td>
<td>3.33%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Quantum Mechanics</td>
<td>1</td>
<td>6</td>
<td>10%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Solid State Physics</td>
<td>2</td>
<td>5</td>
<td>8.33%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mathematics and Statistics of Measurement</td>
<td>1</td>
<td>9</td>
<td>15%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Thermodynamics and Statistical Physics</td>
<td>2</td>
<td>7</td>
<td>11.67%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Laboratory and Computing II</td>
<td>1 &amp; 2</td>
<td>10</td>
<td>16.67%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>One module from elective groups A, B or G</td>
<td>2</td>
<td>6</td>
<td>10%</td>
</tr>
<tr>
<td>Year Three</td>
<td>30.77%</td>
<td>Element I: Core Physics, including Physics Laboratory III, Fluid Dynamics, Light &amp; Matter and Physics of the Universe</td>
<td>1 &amp; 2</td>
<td>18</td>
<td>30%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Element II: MSci Options between 24-27 ECTS from elective groups A-G.</td>
<td>1 &amp; 2</td>
<td>24 to 27</td>
<td>40%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• majority or all from group C</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• maximum of 6 ECTS each from groups A, D &amp; F</td>
<td>1 &amp; 2</td>
<td>24 to 27</td>
<td>40%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• maximum of one in total from groups B &amp; E</td>
<td>1 &amp; 2</td>
<td>24 to 27</td>
<td>40%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Element III: Comprehensive Physics and Professional Skills III</td>
<td>1 &amp; 2</td>
<td>18</td>
<td>30%</td>
</tr>
</tbody>
</table>

*With the agreement of the DUGS in both departments, this may be replaced with an elective module from another Imperial College department subject to space being available.*
<table>
<thead>
<tr>
<th>Year</th>
<th>% Year Weighting</th>
<th>Module</th>
<th>Term(s)</th>
<th>ECTS</th>
<th>% Module Weighting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year Four</td>
<td>38.46%</td>
<td>Element I: Research Interfaces</td>
<td>1 &amp; 2</td>
<td>8</td>
<td>13.33%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Element II: MSci Project</td>
<td>1 &amp; 2</td>
<td>22</td>
<td>36.67%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Element III: MSci Options between 30-35 ECTS</td>
<td>1 &amp; 2</td>
<td>30 to 35</td>
<td>70%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>from elective groups B-E &amp; G</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• majority or all from group D</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• maximum of 6 ECTS in total from groups B, C, E</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• must have at least 30 ECTS from group D in</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>degree</td>
<td></td>
<td></td>
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</tbody>
</table>

\[7\] With the agreement of the DUGS in both departments, this may be replaced with an elective module from another Imperial College department subject to space being available.
<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Core/Elective</th>
<th>Year</th>
<th>L&amp;T Hours</th>
<th>Ind. Study Hours</th>
<th>Placement Hours</th>
<th>Total Hours</th>
<th>% Written Exam</th>
<th>% Coursework</th>
<th>% Practical</th>
<th>FHEQ Level</th>
<th>ECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>PH1-MU</td>
<td>Measurement and Uncertainty</td>
<td>CORE</td>
<td>1</td>
<td>4</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>4</td>
<td>0</td>
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<tr>
<td>P1.9</td>
<td>Mathematics</td>
<td>CORE</td>
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<td>142</td>
<td>233</td>
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<td>375</td>
<td>85%</td>
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<td>0%</td>
<td>4</td>
<td>15</td>
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<td>P1.1.1</td>
<td>Mechanics, Vibrations &amp; Waves</td>
<td>CORE</td>
<td>1</td>
<td>72</td>
<td>128</td>
<td>0</td>
<td>200</td>
<td>85%</td>
<td>15%</td>
<td>0%</td>
<td>4</td>
<td>8</td>
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<td>Imperial College is an independent corporation whose legal status derives from a Royal Charter granted under Letters Patent in 1907. In 2007 a Supplemental Charter and Statutes was granted by HM Queen Elizabeth II. This Supplemental Charter, which came into force on the date of the College’s Centenary, 8th July 2007, established the College as a University with the name and style of &quot;The Imperial College of Science, Technology and Medicine&quot;. <a href="http://www.imperial.ac.uk/admin-services/secretariat/college-governance/charters/">http://www.imperial.ac.uk/admin-services/secretariat/college-governance/charters/</a></td>
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