# Programme Specification (Undergraduate)

## BEng Electrical and Electronic Engineering

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

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>Programme Title</strong></td>
<td>Electrical &amp; Electronic Engineering</td>
</tr>
<tr>
<td><strong>Award(s)</strong></td>
<td>BEng</td>
</tr>
<tr>
<td><strong>Programme Code(s)</strong></td>
<td>H600</td>
</tr>
<tr>
<td><strong>Awarding Institution</strong></td>
<td>Imperial College London</td>
</tr>
<tr>
<td><strong>Teaching Institution</strong></td>
<td>Imperial College London</td>
</tr>
<tr>
<td><strong>Faculty</strong></td>
<td>Faculty of Engineering</td>
</tr>
<tr>
<td><strong>Department</strong></td>
<td>Department of Electrical and Electronic Engineering</td>
</tr>
<tr>
<td><strong>Associateship</strong></td>
<td>City and Guilds of London Institute (ACGI)</td>
</tr>
<tr>
<td><strong>Main Location of Study</strong></td>
<td>South Kensington Campus</td>
</tr>
<tr>
<td><strong>Mode and Period of Study</strong></td>
<td>3 academic years full-time</td>
</tr>
<tr>
<td><strong>Cohort Entry Points</strong></td>
<td>Annually in October</td>
</tr>
<tr>
<td><strong>Relevant QAA Benchmark Statement(s) and/or other external reference points</strong></td>
<td>Honours Degrees in Engineering</td>
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<tr>
<td><strong>Total Credits</strong></td>
<td></td>
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<tr>
<td><strong>BEng</strong></td>
<td>ECTS: 186  CATS: 360</td>
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<tr>
<td><strong>FHEQ Level</strong></td>
<td>Level 6</td>
</tr>
<tr>
<td><strong>EHEA Level</strong></td>
<td>1st cycle</td>
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<tr>
<td><strong>External Accreditor(s)</strong></td>
<td>Institute of Engineering and Technology (IET)</td>
</tr>
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<td></td>
<td>Accreditation received: 2014</td>
</tr>
<tr>
<td></td>
<td>Accreditation renewal: 2018</td>
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### Specification Details

| **Student cohorts covered by specification** | 2018-19 entry |
Person responsible for the specification | Dr. K. Fobelets
---|---
Date of introduction of programme | October 2013
Date of programme specification/revision | May 2018

**Programme Overview**

The goal of this course is the preparation of high quality graduates who will innovate beyond the current practises, whether in the electronic/electrical industry, in information technology, in research, or in financial establishments. Our teaching and learning is supported by a variety of teaching methods including large group lecture sessions, small group exercise sessions as well as 3-to-1 tutorial sessions. In addition, laboratory sessions and group projects are carried out from year 1 onwards. Members of staff are experts in their field and bring their research and industrial expertise into the classrooms.

The BEng course modules overlap with that offered on the MEng course except for the 3rd year and final BEng year where a reduced number of modules is taken in order to invest time in a final year project. The BEng does not fulfill the minimum educational requirement to become a Chartered Engineer, further academic studies (as in e.g. an MSc) will be required for CEng accreditation. The BEng study program can lead towards an Incorporated Engineering status.

Teaching on this programme is based on an integrated 3-year programme leading to the award of a BEng degree. The BEng course has been designed based upon a number of key principles:

- **Competence in the fundamental principles of mathematics and electrical/electronic engineering**: Students are expected to develop a firm grasp of the fundamental concepts and principles, and able to model complex systems analytically, to analyse and optimise these models.
- **Competence in computing**: Students are expected to acquire a level of competence in both programming and in using the latest computing technologies.
- **Pro-active learning**: Students are expected to learn how to learn by themselves and acquire the skill and discipline of lifelong learning.
- **Design Proficiency**: Students are expected to develop their ability to incorporate concepts into design of new products or processes, to provide innovations.
- **Development of professional and transferrable skills**: Students are expected to learn how to work in groups, develop their abilities to communicate scientific/engineering ideas orally or in written form, and to develop general problem-solving skills.
- **Industrial perspectives**: Students are expected to participate in industrial internships where possible.
- **Flexibility of provision**: We aim to provide students with a wide variety of options in the last year of the course in order to allow them to specialise in specific areas in electrical/electronic engineering and in computing.

**Learning Outcomes**

**Knowledge and Understanding**

- Fundamental concepts and physical principles that underpin electrical and electronic engineering in the areas of circuits, systems, networks and algorithms.
- Mathematical principles and techniques that underpin the analysis of engineering systems and circuits.
- The application of the principles to engineering design and analysis.
• Software engineering and programming skills as appropriate to electrical and electronic engineering.
• Role of business processes in engineering, including the commercial, societal and legal framework within which industry operates.
• Moral and ethical issues including professional conduct and intellectual property.

Intellectual Skills
• Performance of the analysis of engineering systems and circuits in order to solve qualitative and quantitative problems;
• Synthesise solutions using established methodologies;
• Adapt and apply methodologies to the solution of unfamiliar problems;
• Derive methodologies for unfamiliar problems;
• Practical application of theory using computer software and models;
• Demonstrate the skills necessary to plan, conduct and report a programme of independent research.

Practical Skills
• Acquisition and interpretation of data and testing hypotheses;
• Interpretation of datasheets and industry standards;
• Construction and testing of circuits;
• Implementation of algorithms as software code;
• Use of commercial software tools to analyse, design and simulate engineering systems;
• Recognise risks and identify safe working practices;
• Preparation of technical reports.

Professional Skills Development
• Communication of scientific material and arguments in written and oral formats;
• Recognise professional and ethical issues in the use of technology and identify appropriate ethical, professional and legal practices;
• Recognise issues of leadership and responsibility;
• Adoption of appropriate roles in group activities;
• Ability to interact with professionals from other disciplines;
• Ability to make decisions in complex and unpredictable situations;
• Ability to plan work in terms of time-plans and deliverables;

Independent learning ability required for continuing professional development.

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

Entry Requirements

<table>
<thead>
<tr>
<th>Academic Requirement</th>
<th>Grade Requirement</th>
<th>Subject Requirements</th>
</tr>
</thead>
</table>
|                      | Normally a minimum A*AA overall | A* in Mathematics  
|                      |                   | A in Physics  
<p>|                      |                   | (or a comparable qualification recognised by the College) |
|                      |                   | Relevant subjects for the remaining A-level include: Applied ICT, Biology, Chemistry, |</p>
<table>
<thead>
<tr>
<th><strong>International Baccalaureate (IB)</strong></th>
<th><strong>Grade Requirement</strong></th>
<th>Minimum <strong>38</strong> overall.</th>
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<tbody>
<tr>
<td><strong>Subject Requirements</strong></td>
<td></td>
<td><strong>6</strong> in Mathematics at higher level <strong>6</strong> in Physics at higher level</td>
</tr>
<tr>
<td><strong>GCSE Requirements</strong></td>
<td></td>
<td><strong>B</strong> in English (or a comparable qualification recognised by the College).</td>
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<tr>
<td><strong>English Language Requirement</strong></td>
<td></td>
<td><strong>Standard requirement</strong> IELTS score of 6.5 overall (minimum 6.0 in all elements)</td>
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<tr>
<td><strong>Admissions Tests</strong></td>
<td></td>
<td>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.</td>
</tr>
<tr>
<td><strong>Interview</strong></td>
<td></td>
<td>Yes</td>
</tr>
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</table>

The programme’s competency standards document can be found at: [http://www3.imperial.ac.uk/electricalengineering/teaching/undergraduate/teaching](http://www3.imperial.ac.uk/electricalengineering/teaching/undergraduate/teaching)

**Learning & Teaching Strategy**

| **Scheduled Learning & Teaching Methods** | • Lectures • Problem solving classes • Tutorial sessions |
| **E-learning & Blended Learning Methods** | • Hardware laboratory • Software laboratory |
| **Project Learning Methods** | • Group projects • Individual projects |
| **Placement Learning Methods** | • N/A |

**Assessment Strategy**

| **Assessment Methods** | • Written examinations • Coursework software or hardware deliverable • Oral and poster presentations • Reports |

**Academic Feedback Policy**
The progress of first year students is evaluated via a Christmas and Easter test. Students receive feedback on these through their tutorials and study groups. Written feedback is made available on reports while in-situ comments give feedback on presentations.

Two feedback strategies are applied to coursework based modules in the 3rd year. One involves comments on the individual reports while the second approach involves feedback sessions in class that discuss the solutions.

Feedback on exams is made available via the on-line publication of the answers with annotations that highlight the strength and weakness of understanding of the cohort on particular aspects of the module covered in the exams.

**Re-sit Policy**

The departmental re-sit policy is available in the Awards of Honours document at: [https://workspace.imperial.ac.uk/electricalengineering/Public/HonoursSchemes/EEE%20Scheme%20for%20Award%20of%20Honours%202015-16.pdf](https://workspace.imperial.ac.uk/electricalengineering/Public/HonoursSchemes/EEE%20Scheme%20for%20Award%20of%20Honours%202015-16.pdf)


**Mitigating Circumstances Policy**

The department’s policy on the registering of Mitigating Circumstances is available at: [http://www3.imperial.ac.uk/electricalengineering/teaching/undergraduate/examinations/illnessug](http://www3.imperial.ac.uk/electricalengineering/teaching/undergraduate/examinations/illnessug)


**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>
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</thead>
<tbody>
<tr>
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<td>5</td>
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<th>Pre-Session</th>
<th>Term One</th>
<th>Term Two</th>
<th>Term Three</th>
<th>Term Four</th>
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<table>
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<th>Pre-Session</th>
<th>Term One</th>
<th>Term Two</th>
<th>Term Three</th>
<th>Term Four</th>
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<td>Elective Modules</td>
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<td>3</td>
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**Assessment Dates & Deadlines**

**Year One**

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

**Year Two**

<table>
<thead>
<tr>
<th>Written Examinations</th>
<th>June</th>
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<tbody>
<tr>
<td>Coursework Assessments</td>
<td>Continuous</td>
</tr>
<tr>
<td>Project Deadlines</td>
<td>Continuous</td>
</tr>
<tr>
<td>Practical Assessments</td>
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**Year Three**

<table>
<thead>
<tr>
<th>Written Examinations</th>
<th>December</th>
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<tbody>
<tr>
<td>Coursework Assessments</td>
<td>Continuous in term 2</td>
</tr>
<tr>
<td>Project Deadlines</td>
<td>June</td>
</tr>
<tr>
<td>Practical Assessments</td>
<td>N/A</td>
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</tbody>
</table>

**Assessment Structure**

**Rules of Progression**

**Year 1**
In order to progress to Part II, students are normally required to achieve the following minimum marks:

a) 40% in each of the examined modules.
b) 40% in the aggregate of the practical work.

**Year 2**
In order to progress to Part III of BEng, students are normally required to achieve the following minimum marks:

a) 40% in each of the examined modules.
b) 40% in the aggregate of the practical work.

Compensation: 1 module (excluding maths) with a mark in the range 30% to 40% can be compensated (considered as a pass), if the exam aggregate is > 45%
Year 3
To obtain an honours degree, a candidate must obtain at least 40% in Part III, normally by obtaining at least 40% in the individual project and in the module aggregate. There is no pass mark for individual modules, only for the module aggregate.

Marking Scheme

<table>
<thead>
<tr>
<th>Weightings</th>
<th>Part I</th>
<th>Part II</th>
<th>Part III</th>
<th>Total</th>
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</thead>
<tbody>
<tr>
<td>MEng</td>
<td>12.5%</td>
<td>37.5%</td>
<td>50%</td>
<td>100%</td>
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</tbody>
</table>

Final Assessment and Honours Classification

The marks from each Part are combined using the weightings defined as:

- First class honours: $A > 70\%$
- Second class honours (upper division): $70 > B > 60\%$
- Second class honours (lower division): $60 > C > 50\%$
- Third class honours: $50 > D > 40\%$
- Fail: $40 > E$
<table>
<thead>
<tr>
<th>Year</th>
<th>% Year Weighting</th>
<th>Module</th>
<th>% Module Weighting</th>
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<td>Year One</td>
<td>12.5%</td>
<td>Analysis of Circuits</td>
<td>7.5%</td>
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<tr>
<td></td>
<td></td>
<td>Digital Electronics 1</td>
<td>7.5%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Semiconductor Devices</td>
<td>7.5%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Analogue Electronics 1</td>
<td>7.5%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Energy Conversion</td>
<td>7.5%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Introduction to Signals and Communications</td>
<td>7.5%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Software Engineering 1: Introduction to Computing</td>
<td>7.5%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mathematics I (E-stream and I-stream)</td>
<td>15%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Engineering Design and Practice</td>
<td>7.5%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>EEE 1st Year Electronics Lab</td>
<td>15%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>EEE1 Project</td>
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<tr>
<td>Year Two</td>
<td>37.5%</td>
<td>Digital Electronics II</td>
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<td>Analogue Electronics II</td>
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<td>Power Engineering</td>
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<td>Communication Systems</td>
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<td></td>
<td>Signals and Linear Systems</td>
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<td>Control Engineering</td>
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<td>Mathematics II</td>
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<td></td>
<td>Algorithms and Data Structures</td>
<td>9%</td>
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<td>Computer Architecture I</td>
<td>9%</td>
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<td>EEE2 Electronics Lab</td>
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<td>EEE2 Electronics Design Project</td>
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<td></td>
<td>2 x modules from elective group (A)</td>
<td>4% each</td>
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<td>Year Three</td>
<td>50%</td>
<td>EEE3 BEng Project</td>
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<tr>
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<td></td>
<td>4 x modules from elective group (B)</td>
<td>9.3% each</td>
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<tr>
<td></td>
<td></td>
<td>2 x modules from elective group (C)</td>
<td>9.3% each</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 x module from elective group (D)</td>
<td>9.3%</td>
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<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>% Course-work</th>
<th>% Practical</th>
<th>FHEQ Level</th>
<th>ECTS</th>
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<tr>
<td>EE1-01</td>
<td>Analysis of Circuits</td>
<td>CORE</td>
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<td>35</td>
<td>90</td>
<td>0</td>
<td>125</td>
<td>100%</td>
<td>0%</td>
<td>0%</td>
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<td>EE1-02</td>
<td>Digital Electronics 1</td>
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<td>90</td>
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<td>125</td>
<td>100%</td>
<td>0%</td>
<td>0%</td>
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<td>Semiconductor Devices</td>
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<td>35</td>
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<td>0</td>
<td>125</td>
<td>100%</td>
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<tr>
<td>EE1-04</td>
<td>Analogue Electronics 1</td>
<td>CORE</td>
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<td>EE1-05</td>
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<td>EE1-06</td>
<td>Introduction to Signals and Communications</td>
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<tr>
<td>EE1-07</td>
<td>Software Engineering 1: Introduction to Computing</td>
<td>CORE</td>
<td>1</td>
<td>20</td>
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<td>100%</td>
<td>0%</td>
<td>4</td>
<td>5</td>
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<tr>
<td>EE1-10</td>
<td>Mathematics I (E-stream and I-stream)</td>
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<td>90</td>
<td>160</td>
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