## Professional Skills and Basic Electronics 1

<table>
<thead>
<tr>
<th>Module Code</th>
<th>P1.7</th>
<th>FHEQ Level</th>
<th>Level 4</th>
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<tbody>
<tr>
<td>Pre-requisites</td>
<td>None</td>
<td>Co-requisites</td>
<td>None</td>
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<tr>
<th>Primary Department</th>
<th>Physics</th>
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<tbody>
<tr>
<td>Module Leader</td>
<td>Dr Simon Bland (Professional Skills), Mr Christopher Carr (Basic Electronics)</td>
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| Additional Teaching Departments | None |

| Teaching Staff | Year 1 Academic Tutors (Professional Skills) Mr Christopher Carr + Associate + Demonstrators (Basic Electronics) |

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<thead>
<tr>
<th>Programmes on which the Module is delivered</th>
<th>Core/Elective</th>
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<tbody>
<tr>
<td>All UG Physics programmes (F300, F303, F309, F325, F390, F3W3, F3XC, F3XD)</td>
<td>Core</td>
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### Learning Outcomes

**On completing the Professional Skills course, students will have:**

- Experienced working in a formal group, where delegation of tasks, effective communication and pooling of ideas is essential to success
- Thought about how to select material from a body of researched literature in order to present it both as a talk and on paper
- Improved their ability to read technical literature for understanding and to summarise it
- Begun to grasp how professionals place high value on the accurate referencing of literature/web sources
- Had practice in presenting / asking questions to a small group of peers
- Been introduced to the building blocks of problem solving in physics
- Appreciated the value of approximate and order-of-magnitude techniques
- Developed their ability to tackle unfamiliar, unstructured problems

**On completing the Basic Electronics course, students will:**

- Understand charge, current, potential difference, power and the appropriate units to represent these terms
- Be able to use Kirchhoff’s laws and the principle of superposition to analyse simple circuits
- Know the linear and differential relationships between charge, current and voltage for resistors, capacitors and inductors and to be able to describe the energy storage and/or dissipation in these devices
- Be able to describe sinusoidal signals in terms of complex numbers and understand the nature of phase, phase lead, and lag
- Understand complex impedance and be able to calculate this for series and parallel combinations of passive circuit elements
- Be able to describe the characteristics of both idealised and ‘real-world’ voltage and current sources
- Be able to find Norton and Thévenin equivalent circuits for arbitrary networks of passive components and sources
- Be able to analyse or design simple high and low pass filters using AC circuit analysis
- Understand the frequency-dependent behaviour of circuits and characterise this using Bode plots
- Be aware of the equivalence of tuned electrical circuits to other physical systems described by similar differential equations, such as the damped mechanical oscillator
- Know how to derive the resonant frequency and Q value of a series LCR circuit and be able to give example uses for such a circuit
- Be able to use LTSPICE as an aid to circuit design and evaluation

**Description of Content**

The Professional Skills course is taught through a weekly tutorial session in both Terms 1 and 2. In Term 1 and the first weeks of term 2 the focus is on developing practical skills useful to physicists, including the ability to communicate in an effective manner, and the ability to work in teams. This is achieved through participation in a group project, a CV and cover letter writing exercise and the preparation of a topical review. Subsequent weeks of Term 2 are spent developing problem solving skills, primarily through practice in tutorials, and assessed by a test at the start of Term 3.

The Basic Electronics course provides a basic introduction to electronics for Year 1 students to the level of DC and AC circuit analysis involving ‘non active’ components. It consists of 9 lectures supported by 3 tutorials and a 2 hour simulation lab session in the Computer Suite. Assessment is via a 30min test in the summer term.

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<tr>
<th>Assessment</th>
<th>Assessment Type</th>
<th>Weighting</th>
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<tbody>
<tr>
<td>Group Project (Poster, Presentation, Portfolio)</td>
<td>Coursework</td>
<td>24%</td>
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<tr>
<td>CV and cover letter</td>
<td>Coursework</td>
<td>8%</td>
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<tr>
<td>Topical review</td>
<td>Coursework</td>
<td>8%</td>
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<tr>
<td>Basic Electronics assessed problem sheet question</td>
<td>Coursework</td>
<td>3%</td>
</tr>
<tr>
<td>Problem solving test</td>
<td>Examination</td>
<td>40%</td>
</tr>
<tr>
<td>Basic Electronics test</td>
<td>Examination</td>
<td>17%</td>
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<tr>
<th>Learning &amp; Teaching Hours</th>
<th>Independent Study Hours</th>
<th>Placement Hours</th>
<th>Total Hours</th>
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<tbody>
<tr>
<td>ECTS Credit</td>
<td>5</td>
<td>CATS Credit</td>
<td>10</td>
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<thead>
<tr>
<th>Date of introduction</th>
<th>Date of Last Revision</th>
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<tbody>
<tr>
<td>01/10/2016</td>
<td>19/09/2017</td>
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