Electrical Principles and Automation (TK)

<table>
<thead>
<tr>
<th>Full Title</th>
<th>Electrical Principles and Automation (TK)</th>
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<tbody>
<tr>
<td>Status</td>
<td>Uploaded to Banner</td>
</tr>
<tr>
<td>Start Term</td>
<td>2020</td>
</tr>
<tr>
<td>NFQ Level</td>
<td>06</td>
</tr>
<tr>
<td>ECTS Credits</td>
<td>05</td>
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<tr>
<td>Module Code</td>
<td>ELEC06012</td>
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<tr>
<td>Duration</td>
<td>Stage - (26 Weeks)</td>
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<tr>
<td>Grading Mode</td>
<td>Numeric</td>
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<tr>
<td>Department</td>
<td>Electronic &amp; Electrical Eng</td>
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<tr>
<td>Module Author</td>
<td>Alan Hannon</td>
</tr>
<tr>
<td>Co Authors</td>
<td>Carine Gachon</td>
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Module Description

Electrical Fundamentals
This module will cover the fundamental principles of electrical sciences and instrumentation. Students will learn to design, build, analyse and troubleshoot basic electrical and instrumentation circuits using microcontrollers through both theory and practical applications.

Learning Outcomes

On completion of this module the learner will/should be able to:

1. Analyse basic circuits using the fundamental laws of electrical science.
2. Describe the technology and use of common electrical and electronic components.
3. Illustrate and discuss the technology and use of common sensors and actuators.
4. Explain the basic principles of electrical power generation.
5. Apply basic safety principles
6. Specify, select, build and troubleshoot basic electrical/instrumentation circuits using microcontrollers.

Indicative Syllabus

Introduction to Health & Safety when dealing with electricity
Charge of electrons
Voltage, quantity of electricity and current
Resistors and resistance
Ohm’s law
Energy, power and heating effect
Kirchhoff’s Current law
Kirchhoff’s Voltage Law
Series and Parallel circuit
Magnetism and Electro-magnetism
Motors and Generators
Alternating current and voltage
Capacitors
Inductors
Transformers
Common electronic components
Teaching and Learning Strategy

The module is divided into theory and practical sessions.

In the theory elements students learn the fundamentals of electrical science and analyse basic electrical and electronic circuits. Theory elements are delivered through lecture based classes which the student must engage through participation in peer learning teaching techniques, observation techniques, peer reviews, active learning strategies, student centred learning discussions, and use of online learning technologies.

In the practical elements, students learn to design basic electrical and instrumentation circuits, select appropriate components and build the circuits. They learn to specify, build and troubleshoot basic electrical circuits. Practical elements include:

- Structured workshops on software
- Hands-on, interactive workshops on practical elements which including working as an individual, group work, case study exercises and problem-based and design-led teaching and learning.

Assessment Strategy

Their knowledge of the fundamentals of electrical science as well as their ability to analyse basic circuits is assessed by an exam type assessment. Short in-class quizzes and online quizzes are also used as formative assessments.

Their ability to design and build circuits is assessed in practical's. These are divided into task based practical's and projects. Formal labs assess both software and practical elements of the module. Software programs are submitted and practical evaluation of relevant circuits are completed. In some cases, online quizzes are used to assess their understanding of the tasks completed.

Repeat Assessment Strategies

A repeat exam will be available in autumn which will cover the percentage of marks obtained in the final assessment. The marks obtained in the coursework throughout the year cannot be repeated via a repeat autumn examination and thus will be carried forward from the previous attempt.

Indicative Coursework and Continuous Assessment:

<table>
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<tr>
<th>Form</th>
<th>Title</th>
<th>Percent</th>
<th>Week (Indicative)</th>
<th>Learning Outcomes</th>
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<tbody>
<tr>
<td>Assessment</td>
<td>Exam type assessment</td>
<td>40 %</td>
<td>End of Term</td>
<td>1,2,3,4</td>
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<tr>
<td>Assessment</td>
<td>Quizzes</td>
<td>20 %</td>
<td>OnGoing</td>
<td>1,2,3,4</td>
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<tr>
<td>Practical Evaluation</td>
<td>Labs/Project</td>
<td>40 %</td>
<td>OnGoing</td>
<td>5,6</td>
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Blended Delivery Mode Average Weekly Workload:

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<tr>
<th>Type</th>
<th>Description</th>
<th>Location</th>
<th>Hours</th>
<th>Frequency</th>
<th>Weekly Avg</th>
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<tbody>
<tr>
<td>Practical</td>
<td>GMIT Lab</td>
<td>Laboratory</td>
<td>2</td>
<td>Weekly</td>
<td>2.00</td>
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Required Reading Book List


Programme Membership

GA_EAURG_B07 202000 Bachelor of Engineering in Automation & Robotics
GA_EAURG_C06 202000 Higher Certificate in Engineering in Automation & Robotics