**Module Title:** Analogue Signal Processing  
**Code:** EE4C15

<table>
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<tr>
<th><strong>Level:</strong> Senior Sophister</th>
<th><strong>Credits:</strong> 5</th>
<th><strong>Prerequisites:</strong> JS Year</th>
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| **Lecturer(s):** Associate Professor  
Dr. M. J. Burke |
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**Terms:** Semester 2  
**Duration (weeks):** 12  
**Lectures/week:** 3  
**Tutorials/week:** 1  
**Total:** 33  
**Total:** 11

**Aims/Objectives**
This module will introduce students of Electronic Engineering and Electronic & Computer Engineering to the analogue electronic circuitry for the interfacing, pre-processing and signal conditioning associated with physical measurements carried out in industrial and laboratory testing environments. The design and implementation of circuits used prior to analogue-to-digital conversion for the purposes of signal amplification, calibration, temperature compensation, impedance matching, bandlimiting, anti-aliasing filtering as well as some non-linear applications will be covered. The circuits examined will be considered as utilising commercially available components such as operational amplifiers, transistors and discrete passive components.

**Syllabus**
Measurements and Signals: physical measurements; signals and characteristics; signal conditioning requirements.

Signal Sources: brief treatment of transducer and electrode characteristics.

Amplifier Design: signal fidelity, design requirements, circuit configurations, instrumentation amplifiers, performance characteristics, non-ideal properties, practical limitations, performance enhancement, physical and laboratory testing and measurement applications.

Non-Linear Applications: precision rectification, peak detection, dynamic range compression, logarithmic amplification.

Active Filters: filter characteristics and properties, filter types and functions, approximation methods, active filter implementation, circuit configurations, design methodologies.

**Associated Laboratory/Project Programme**

**Laboratory Project:** Instrumentation Amplifier Design and Construction  
**Note:** Properly structured laboratory reports must be written on completion of the design project and submitted for marking.

**Recommended Text(s)**
### LEARNING OUTCOMES
On successful completion of this module students should be able to:

1. Describe the properties of a range of physical signals
2. Identify and specify the performance criteria of signal conditioning amplifiers
3. Analyse the characteristics and performance of various amplifier configurations
4. Design analogue circuits for non-linear functions
5. Evaluate and specify the characteristics of active filters
6. Design suitable amplifiers and filters for practical instrumentation applications.

### TEACHING STRATEGIES
The module is taught using a combination of lectures, tutorials and supporting laboratories. During the tutorials students will develop their problem solving skills by tackling problems based on the lecture material. Their design skills will be developed in carrying out a laboratory-based design project.

### ASSESSMENT MODE(S)
The two-hour written examination will contribute 80% and the laboratory project will contribute 20% to the overall subject mark at the Annual Examinations.