**Module Title:** Telecommunications  
**Code:** EEU33C05

<table>
<thead>
<tr>
<th>Level: Junior Sophister</th>
<th>Credits: 5</th>
<th>Prerequisites:</th>
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<tbody>
<tr>
<td>Lecturer: TBD</td>
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<tr>
<td>Terms: Semester 2</td>
<td>Lectures/week: 3</td>
<td>Tutorials/week: 1</td>
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<tr>
<td>Duration (weeks): 12</td>
<td>Total: 33</td>
<td>Total: 11</td>
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**Aims/Objectives**

The aim of the module is to introduce students to the theory and applications of telecommunication systems. Topics covered in this module include an introduction to random processes, information theory, data compression, error control coding algorithms and modulation schemes.

**Syllabus**

- Introduction to Random Processes (moments and autocorrelation, power spectral density and related theorems, white noise)
- Introduction to Communication Systems
- Applications of Communication Systems
- Introduction to Information Theory
- Lossless Compression (e.g. Huffman and LZW)
- Coding Techniques (e.g. Hamming Coding)
- Analog Modulation (e.g. AM and FM)
- Digital Modulation (e.g. PSK and QAM) and BER performance
- Performance versus cost trade-offs in Communication System Design

**Associated Laboratory/Project Programme**

T1 Analog Modulation  
T2 Digital Modulation

**Recommended Texts**

2. T. Cover, Elements of Information Theory, Wiley, 2006  
### Learning Outcomes

On completion of this module the student will be able to:

1. Understand key concepts of random processes.
2. Understand the basics of telecommunication systems, and in particular of wireless systems.
3. Understand key concepts in information theory (e.g. entropy, capacity of channels).
4. Apply different compression techniques to data and explain the advantages and disadvantages of the different options.
5. Apply different channel coding techniques to data and demonstrate the types of error that can be corrected.
6. Describe and explain a number of analog modulation schemes and calculate bandwidth and power consumption of the different schemes.
7. Describe and explain a number of digital modulation schemes and calculate BER performance under different conditions.
8. Explain the trade-offs that can be made in the design of communication systems.

### Teaching Strategies

The module is taught using a combination of lectures, tutorials and laboratories.

### Assessment Mode(s)

At the Annual examinations 70% of the 3C5 module mark is determined via the two-hour written examination, 20% via two in-class tests, and the remaining 10% via the laboratories.

The overall module mark at the Supplemental examinations will be determined solely on the basis of the written examination.