This is a level 4 course (3 ECTS)

1 Aim:

To understand the nature of information and how it may be coded for communications.

- Identify and quantify information in a given situation
- Quantify the bit-rate requirement of digital signalling of various information sources
- Describe, mathematically and pictorially, how to transform signals into forms suitable for transmission
- Understand how data may be coded, compressed and encrypted
- Understand sources of noise and their effects on detection and information transfer

2 Objectives:

This lecture course provides an introduction to information theory, including the following topics:

- Quantifying Information
- Conditional Entropy
- Effect of Noise on information
- Noise and Bit Error Rates
- Source coding
- Data compression
- Channel coding
- Data Encryption
- Understanding Analogue signals
- Analogue signals: Modulation and Sampling
3 Textbooks

The course is not based directly on any one book. Recommended reading for the course:

- Information and Measurement
  
  JCG Lesurf (*IoP Publishing*)

- Information and Communication for Engineers
  
  MJ Usher & C.G. Guy (*Macmillan*)

- Information Theory, Inference, and Learning Algorithms
  
  David MacKay (*Cambridge University Press, 2003 available online*)

- Elements of Information Theory
  
  TM Cover and JA Thomas (*Wiley available online*)