



The  
University  
Of  
Sheffield.

Electronic &  
Electrical  
Engineering.

## EEE227      COMMUNICATION ELECTRONICS

**Credits:      20**

### Course Description including Aims

This module introduces the basic structure of a communication system and examines the various circuits and signal engineering strategies that are necessary to make a system work. The idea of spectrum as a limited resource and some of the regulatory framework that allows multiple use of spectrum without conflict between users is introduced. The unit, which aims to form a bridge between communication systems and electronics, will include a number of case studies in order to place ideas in a sensible context.

The specific aims of the unit are . . .

1. To provide the necessary mathematical background for signal and systems analysis, signal processing and its applicability in communication electronics.
2. To provide an introduction to the field of communication systems, including nomenclature, methodology and applications.
3. To introduce the concept of modulation and examine its influence on system performance.
4. To examine typical circuits for implementing both analogue and digital modulation and demodulation.
5. To introduce the idea of synthesising circuits to achieve specified transfer functions in the context of active filters.
6. To introduce the concepts of oscillators and the circuits that may be employed.
7. To develop the experimental competence of students in the area of electronic measurement.

### Outline Syllabus

Signals and systems, analogue modulation, circuits for modulation. Fourier analysis. Digital modulation, multiplexing. Introduction to transmission lines, reflection coefficients. Receivers, demodulation, circuits for demodulation. 1<sup>st</sup> and 2<sup>nd</sup> order systems. Linear oscillators.

### Time Allocation

48 hours of lectures (inc case studies), 24 hours problem classes, 12 hours of laboratory work, 113 hours of guided independent study.

### Recommended Previous Courses

Knowledge equivalent to first year EEE123.

### Assessment

three hour examination answer 4 questions from 6 in three hours (80%), assessment of lab notebooks (20%)

## Recommended Books

Pearson J	Basic Communication Theory	Prentice Hall
Frenzel L E	Principles of Electronic Communications Systems	McGraw Hill
Peterson D	Audio, Video and Data Telecommunications	McGraw Hill
Sedra A S & Smith K C	Microelectronic Circuits	Oxford

## Objectives

By the end of the unit, a candidate will be able to,

1. manipulate discrete and continuous signals using common techniques such as time shifting, time scaling, amplitude scaling and modulation
2. explain the basic principles underlying a communication system.
3. choose which type of modulation to use for a specific application.
4. display knowledge of representative types of circuitry to implement various modulation and demodulation schemes
5. derive and interpret transfer functions for first and second order systems
6. use normalised filter polynomials, in conjunction with first and second order circuits to realise basic low pass active filters
7. Design linear oscillators for use in communication electronics.
8. Use standard electronic measurement equipment to measure static and time varying electrical quantities and assess the behaviour of electronic networks.