The University Of Sheffield.

EEE6222 ADVANCED COMMUNICATION PRINCIPLES

Credits: 15

Course Description including Aims

This course considers the mathematical foundations and the derived theories and techniques used by a wide range of communication systems, particularly the more recent digital systems. The aim of this course is to

1. Provide the very mathematical foundation for understanding modern communication systems.
2. Present the structure of modern communication systems and the basic issues at each stage in the system.
3. Create a theoretical background that applies to all communication systems and is not affected by any particular technology.

Outline Syllabus

Components of a typical communication system. Discrete-time samplimg and frequency domain representation. Random signals. Power Spectrum Estimation. Formatting and source encoding. Information and entropy. Channel capacity. Hartley-Shannon law. Probability of error in transmission. M-ary signalling. Types of transmission channel and their limitations. Maximum Likelihood receiver. Matched Filter. Methods of Transmission. Methods of synchronisation. Multiplexing and multiple access. Spread spectrum objectives and techniques.

Time Allocation

36 lectures plus 12 hours of additional support material.

Recommended Previous Courses

Assessment

3 hour examination, answer 4 questions from 6.

Recommended Books

Sklar, B.	*Digital Communications*	Prentice-Hall
Roden, M.S	*Digital Communication Systems Design*	Prentice-Hall
Brewster, R.L.	*Telecommunications Technology*	Ellis Horwood
Young P.H.	*Electronic Communication Techniques*	Macmillan
Lee W.C.Y.	*Mobile Communications Design Fundamentals*	Wiley

Objectives

By the end of this module students will be able to

1. Understand that communication is the process of exchanging information.
2. Understand the key basic mathematical concepts underpinning communication systems
3. Understand the function of the key building blocks of a generic digital communication system and the main techniques used for each block calculate the information content and coding efficiency of a message and where possible, reduce (or compress) the average code length of the message.
4. Display familiarity with techniques that maximise spectrum utilisation.
5. Understand how noise limits the information rate and to be aware of techniques that maximise signal detection in the presence of noise.
6. Appreciate the fundamental nature of the trade-off between error performance and bandwidth in a communications system.
7. Describe current technological advances and show how they allow a closer approximation to theoretical information capacity limits.