Module Type		Taught	
Level		5	Credit Value: 20
Programme(s) in which module is available		BEng: Electrical and Electronic Engineering; Communication Engineering;	
Involvement of Other Schools		None	
Resource Split		N/A	
Name of Module Co-ordinator		Prof Ian Bennion, Dr David Webb	
Related Modules	Pre-requisites	EE1ESE; EE1DAE or equivalent	
	Co-requisites	None	
	Prohibited Combinations	None	
Minimum and Maximum Intake Sizes		None	

Aims of the Module

- To provide students with a more advanced knowledge and understanding of analogue electronics, including an ability to design circuits to a given specification;. electronics as applied to the acquisition and processing of data prior to analogue to digital conversion.
- To provide a comprehensive introduction to the fundamental techniques used in the description, analysis and design of modern analogue and digital telecommunications circuits and systems.

Summary of Content

Analogue Electronics: The bipolar transistor: operation and circuit design. The field effect transistor: operation and circuit design. Applications I - Power supplies. Applications II – Oscillators
Signal Acquisition: Overview of signal acquisition, including analogue to digital conversion (ADC), digital to analogue conversion (DAC).

Telecommunications: Properties of communication channels. Transmission line theory. Noise.
Modulation. Amplitude Modulation. Frequency division multiplexing. Angle modulation. FM modulators and demodulators; FM radio receiver. Television.
ASK, FSK and PSK. Pulse amplitude modulation; time division multiplexing; sampling theorem; pulse code modulation.
Introduction to line codes. Noise in PCM; error probability. Introduction to information theory.

Summary of Methods and Frequency of Teaching

Contact hours spread over teaching periods 1 and 2:
Analogue Electronics: Problem based learning: 24 hour; Design exercises: 12 hour;
Telecommunications: Lecture/tutorial sessions: 24 hour, Laboratory practical sessions: 12 hour
Private study: 128 hour

Summary of Methods of Assessment and Feedback (including formative feedback)

The module will be assessed by:
Analogue Electronics: Lab problems and class tests: 25%; Design exercise and mini project work in analogue electronics: 25%
Telecomms: Examination 30%; Laboratory and coursework assessment: 20%

Feedback will be provided according to School guidelines. 1-to-1 feedback will be provided orally in the laboratory, in presentations and demonstrations, and by written comments on written reports. Generic feedback will be provided orally in class and via Blackboard.

Module Outcomes – what the student should gain from successful completion of the module:	Learning and Teaching and Assessment Strategies to enable outcomes to be achieved and demonstrated	
	Learning and Teaching Methods	Assessment Methods
Knowledge and Understanding of • The operation and uses of bipolar transistors, field effect transistors and operational amplifiers.	Problem based learning using discussion class and laboratory	Log book assessment Formal report

• The use of test and measurement techniques for circuit characterisation. • Gain an elementary proficiency in theoretical concepts appropriate to telecommunications.	sessions Lectures, tutorials and practicals	Essay Examination
Intellectual Skills • The ability to analyse and solve engineering problems • The ability to evaluate and integrate information from a variety of sources • The ability to plan, conduct, evaluate and report on a programme of work • The ability to design a solution to an engineering problem subject to various constraints, evaluate that design and make improvement	Problem based learning using discussion class and laboratory sessions. Lectures, tutorials and practicals	Log book assessment Formal report Essay Examination
Professional/Subject Specific Skills • The ability to plan and execute safely a series of measurements • The ability to use test and measurement equipment • The ability to prepare a technical report or presentation • Gain practical experience with Telecommunications principles.	Problem based learning using discussion class and laboratory sessions. Lectures, tutorials and practicals	Log book assessment Formal report Essay
Transferable Skills • The ability to communicate effectively both in writing and orally • The ability to solve problems • The ability to carry out self-study • The ability to use ICT • Independent learning skills to facilitate professional development	Problem based learning using discussion class and laboratory sessions Lectures, tutorials and practicals	Log book assessment Formal report , Essay Examination Some of the skills are assessed indirectly, through their impact on other skills

Introductory Learning Resources	Module information, tutorial material and generic feedback will be available on Blackboard
Core Texts Reading Lists	P. Horowitz and W. Hill, "The Art of Electronics," Cambridge University Press, 2nd Edition, 1989. (This book has not been revised since but is still available. An excellent practical guide - too good not to recommend just because of its age.) N Storey, Electronics. A systems approach, Prentice Hall, 3rd Revised Edition 2006. Haykin, S, Communication Systems, Wiley Dunlop, J and Smith, D G, Telecommunications Engineering, Chapman & Hall Petersen, D, Audio, Video and Data Telecommunications, McGraw-Hill Stremler, F G, Introduction to Communication Systems, Addison-Wesley

Specification completed by: Date	Geof Carpenter 28.7.09