Please complete all sections of the form, referring to the guidance notes where necessary.

School and Subject Group		School of Engineering and Applied Science		
Module Code		EE3ITC		
Module Title		Internetworking		
Module Type		Taught		
Module Replaces (where appropriate)		Existing Module		
Date of introduction of new module		Existing module		
Level		3	Credit Value	10
Programme(s) in which module is available		BEng: Communications Engineering		
Involvement of Other Schools		None		
Resource Split		N/A		
Name of Module Co-ordinator		Prof Sergei Turitsyn		
Related Modules	Pre-requisites	EE2CSE, EE2ESA		
	Co-requisites	None		
	Prohibited Combinations	None		
	Minimum and Maximum Intake Sizes	None		

Aims of the Module

To provide a basic understanding of the nature of information, the effects of noise in analogue and digital transmission systems and the construction of both source codes and error-detection/-correction codes. This module aims to guide the student through the implications and consequences of fundamental theories and laws of information theory and coding theory with reference to the application in modern communication and computer systems. Practical examples such as detection of errors on credit cards and other every day life applications will be discussed**.**

Summary of Content

Information Theory and Coding

- The communication process and the nature of information
- Information sources, measurement of information and the entropy function.
- Sources with and without memory.
- Methods of source encoding. Communication channels; their classification and representation.
- Mutual information .
- The Harley and Shannon laws for channel capacity
- Calculations involving signal-to-noise ratios and error-rates in analogue and digital systems.
- The design of error-detecting and error-correcting codes and the calculation of their effects on error-rates.
- Applications of the information theory and coding. Detection of errors on credit cards and other examples.
- Overview of forward-error correction codes used in fibre optics

Summary of Methods and Frequency of Teaching

Lectures 14 x 1 hour
Distance Learning self-test

Summary of Methods of Assessment

Examination (80%)	1.5 hr examination
Continuous Assessment (20%)	Coursework

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 • enhanced knowledge of probabilities, entropy, measures of information. • a grasp of the factors affecting transmission of information from the Information Theory point of view. • understanding of the key characteristics important for evaluation of the performance of communication systems in terms of the Information Theory.	Lectures, tutorials	Examination and coursework
Intellectual Skills • the ability to apply measures of information. • the ability to understand information theory approaches and apply them to specific problems. • the understanding how to construct simple source codes for binary signals. • the ability to perform calculations for signal-to-noise ratio in analogue transmission systems and error-rates in digital transmission systems affected by noise.. • the understanding how to construct simple source codes for binary signals. • the ability to develop and evaluate methods of presenting information and data • the ability to construct codes capable of detecting/correcting errors and assess their coding efficiency	Lectures, tutorials	Examination and coursework
Professional/Subject Specific Skills • Use the ability to develop and evaluate methods of presenting information and data • the ability to perform grade of service calculations using tables • the ability to construct codes capable of detecting/correcting errors and assess their coding efficiency	Lectures, tutorials	Examination and coursework
Transferable Skills • research and reading skills • information technology skills (students are required to access and download materials from the course distance learning site and Internet) • the ability of students to reflect upon their own presentation skills	Lectures, tutorials	Examination and coursework

Please provide either or both of:	
Introductory Learning Resources	
Core Texts, reading list	John G. Proakis, “Digital Communications”, 4th Edition, McGraw -Hill College, 2000 David McKay, “Information Theory, Inference, and Learning Algorithms”, http://www.inference.phy.cam.ac.uk/itprnn/book.html

Specification completed by: Date	Geof Carpenter 23.01.08
Date module approved by Teaching Committee(s)	Existing module
Date module approved by School Board(s)	