MODULE SPECIFICATION TEMPLATE

**SECTION 1: MODULE SPECIFICATIONS**

1. **Title of the module**

EL677 Digital Communication Systems

1. **School which will be responsible for management of the module**

Engineering and Digital Arts

1. **Start date of the module**

September 2014

1. **The cohort of students (onwards) to which the module will be applicable**

Students entering Stage 3 in 2014/15

1. **The number of students expected to take the module**

90

1. **Modules to be withdrawn on the introduction of this proposed module and consultation with other relevant Schools and Faculties regarding the withdrawal**

EL655, EL665

1. **Level of the module**

H

1. **The number of credits which the module represents**

15

1. **Which term(s) the module is to be taught in (or other teaching pattern)**

Autumn/Spring

1. **Prerequisite and co-requisite modules**

EL5XX Communications Principles (prerequisite)

1. **The programme(s) of study to which the module contributes**

BEng Electronic and Communications Engineering

BEng Electronic and Communications Engineering with a Year in Industry

MEng in Electronic and Communications Engineering

MEng in Electronic and Communications Engineering with a Year in Industry

1. **The intended subject specific learning outcomes and, as appropriate, their relationship to programme learning outcomes**

On successful completion of the module, students will have:

1. An understanding of information theory, error coding and its application in modern communication systems;

 2. An understanding of communication network architectures and protocols.

3. An understanding of the principles of optical communication systems and their performance

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These outcomes are related to the programme learning outcomes in the appropriate curriculum maps as follows:

 ECE/ECEwInd: A1,A2,A3,A5,B1,B3-B5,C1,C3-5,C9

1. **The intended generic learning outcomes and, as appropriate, their relationship to programme learning outcomes**

Students will learn to use ICT, and will develop core key skills, such as learning effectively, critical thinking and time management.

These outcomes are related to the program learning outcomes in the appropriate curriculum maps as follows:

 ECE/ECEwInd: D1,D2, D4,D6

1. **A synopsis of the curriculum**

Lecture Syllabus

INFORMATION THEORY AND CODING

Information theory. Shannon channel capacity. Source coding. Single and matrix parity codes, Hamming distance and error protection properties. Code classification; Block, convolutional, linear, nonlinear, cyclic codes: definition, generator polynomial, encoding and decoding. Convolutional codes; Encoder trees and trellis diagrams, free distance, Viterbi algorithm.

COMMUNICATION NETWORKS

Network types, applications: architectures and topologies. General characteristics of traffic. Characteristics of circuit and packet switching. The access network: telephony and ISDN. Wireless access and mobile communications. The transport network: PDH and SDH. Traffic theory. Modern telecoms networks:WDM, intelligent networks. Data networks: multiple access techniques. LAN access protocols: Ethernet, Wireless LANs, network interconnection. Wide-area packet switched networks, Internet Protocol (IP), TCP; TCP/IP protocols.

OPTICAL COMMUNICATION SYSTEMS

Fundamentals. Propagation in fibres. General system considerations. Optical sources: LEDs and lasers; types, modulation effects, performance. Optical detectors: PIN and avalanche photodiodes. Optical amplifiers, modulators and filters. Receiver performance. System power budget; noise and dispersion. Modulation formats, coherent systems, multiplexing including WDM. Future systems.

Coursework

EXAMPLES CLASS – INFORMATION THEORY AND CODING

 2 one-hour examples classes. Assessed.

EXAMPLES CLASS – COMMUNICATION NETWORKS

 2 one-hour examples classes. Assessed.

EXAMPLES CLASS – OPTICAL COMMUNICATION SYSTEMS

 2 one-hour examples classes. Assessed.

1. **Indicative Reading List**

Recommended Reading

Computer Networking and the Internet, F Halsall, Addison Wesley

Introduction to Communication Systems, Stremler, Addison Wesley

Communication Systems Engineering, Proakis, Salehi, Prentice Hall

Communication Systems, Carlson, Crilly Rutledge, McGraw Hill

Optical Fiber Communications: Principles and Practice, Senior et al., Pearson

Background Reading

Computer Networks, A Tanenbaum,Prentice Hall

Computer Networking, J F Kurose and K W Ross, Pearson

Digital Communications, I A Glover and P M Grant, Prentice Hall

1. **Learning and Teaching Methods, including the nature and number of contact hours and the total study hours which will be expected of students, and how these relate to achievement of the intended learning outcomes**

There will be 36 contact hours consisting of 30 hours of lectures, and six 1 hour examples classes.

The 10 hours of Information Theory and Coding lectures and two examples classes deliver learning outcomes 1.

The 10 hours of Communication Networks lectures and two examples classes deliver learning outcome 2.

The 10 hours of Optical Communication Systems lectures and two examples classes deliver learning outcome 3.

The total student workload will be 150 hours.

1. **Assessment methods and how these relate to testing achievement of the intended learning outcomes**

All learning outcomes are assessed through examinations. Students will be required to answer at least one question in each subject area. The generic learning outcomes will be assessed through the examples classes. In addition, learning outcome 1 is assessed by the Information Theory and Coding examples class assignments. Learning outcomes 2 and 3 are assessed by the assignments from the Communication Networks and Optical Communication Systems examples classes, respectively. Weighting between coursework and the examination is 15:85.

1. **Implications for learning resources, including staff, library, IT and space**

None

1. **The School recognises and has embedded the expectations of current disability equality legislation, and supports students with a declared disability or special educational need in its teaching. Within this module we will make reasonable adjustments wherever necessary, including additional or substitute materials, teaching modes or assessment methods for students who have declared and discussed their learning support needs. Arrangements for students with declared disabilities will be made on an individual basis, in consultation with the University’s disability/dyslexia support service, and specialist support will be provided where needed.**
2. **Campus(es) where module will be delivered**[[1]](#footnote-1)

Canterbury Campus

**SECTION 2: MODULE IS PART OF A PROGRAMME OF STUDY IN A UNIVERSITY SCHOOL**

**Statement by the School Director of Learning and Teaching/School Director of Graduate Studies (as appropriate):** "I confirm I have been consulted on the above module proposal and have given advice on the correct procedures and required content of module proposals"

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| ................................................................Director of Learning and Teaching/Director of Graduate Studies (delete as applicable)…………………………………………………Print Name | ..............................................Date |

**Statement by the Head of School:** "I confirm that the School has approved the introduction of the module and, where the module is proposed by School staff, will be responsible for its resourcing"

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| .................................................................Head of School…………………………………………………….Print Name | ..............................................Date |

Module Specification Template
Last updated November 2011

1. Required for information purposes only. Changes of campus will not require re-approval of the module specification. [↑](#footnote-ref-1)