MEng Electronic Engineering and Cybernetics UCAS code: H670

For students entering Part 1 in 2005

Awarding Institution: The University of Reading
Teaching Institution: The University of Reading
Relevant QAA subject benchmarking group(s): Engineering
Faculty of Science Programme length: 4 years
Date of specification: 28/05/08
Programme Director: Dr R.J.Mitchell
Programme Advisers: Dr J.W.Bowen (Cybernetics) and C.G.Guy (Electronic Engineering)
Board of Studies: Cybernetics
Accreditation: Institution of Engineering and Technology; Institute of Measurement and Control

Summary of programme aims

The programme aims to develop the students' knowledge of the theory and practice of modern electronic engineering and cybernetics, necessary for them to meet the educational requirements set out by the Engineering Council for Chartered Engineer status. (For a full statement of the programme aims and learning outcomes see below)

Transferable skills

The University's Strategy for Teaching and Learning has identified a number of generic transferable skills which all students are expected to have developed by the end of their degree programme. In following this programme, students will have had the opportunity to enhance their skills relating to career management, communication (both written and oral), information handling, numeracy, problem-solving, team working and use of information technology.

As part of this programme students are expected to have gained experience and show competence in the following transferable skills: IT (word-processing, using standard and mathematical software, scientific programming), scientific writing, oral presentation, team-working, problem-solving, use of library resources, time-management, career planning and management, and business awareness.

Programme content

The profile which follows states which modules must be taken (the compulsory part), together with one or more lists of modules from which the student must make a selection (the "selected" modules). Students must choose such additional modules as they wish, in consultation with their programme adviser, to make 120 credits in each Part. The number of modules credit for each module is shown after its title.

Part 1 (three terms)		*Credits*	*Level*
Compulsory modules			
SE1CA5	*Cybernetics and Its Application*	20	C
SE1SA5	*Programming*	20	C
SE1SB5	*Software Engineering*	20	C
SE1EA5	*Electronic Circuits*	20	C
SE1EB5	*Computer and Internet Technologies*	20	C
SE1CB5	*Engineering Mathematics*	20	C

Part 2 (three terms)		*Credits*	*Level*
Compulsory modules			
CY2A6	*Control and Measurement*	20	I
CY2D2	*Neurocomputation*	20	I
SE2A2	*Signals and Telecoms*	20	I
SE2P6	*Engineering Applications*	20	I
EE2A2	*Embedded Microprocessor Systems*	20	I
EE2C2	*Digital Circuit Design*	10	I
EE2D6	*FPGAs and HDLs*	10	I

Part 3 (three terms)		*Credits*	*Level*
Compulsory modules			
CY3A2	*Computer Controlled Feedback Systems*	20	H
CY3B2	*Machine Intelligence*	10	H
EE3C2	*Digital & Data Communications*	20	H
SE3Z5	*Social, Legal and Ethical Aspects of Science and Engineering*	20	H
and CY3P2	*Cybernetics Project*	30	H
or EE3P2	*Electronic Engineering Project*	30	H
Optional modules must be chosen to give a total of 120 credits			
CY3C2	*State Space*	10	H
CY3D2	*Measurement Systems*	10	H
CY3F2	*Virtual Reality*	10	H
CY3G2	*Modern Heuristics*	10	H
CY3L2	*Mechatronics*	10	H
CY3K7	*Bionics*	10	H
CY3N7	*Mechanical Design*	10	H
EE3A2	*Digital Signal Processing*	10	H
EE3D2	*Power Electronics*	10	H
EE3F2	*Video Engineering and Digital Media*	10	H
EE3H7	*Analogue Circuit Simulation*	10	H
EE3V7	*Functional Verification*	10	H
	Language from IWLP	20	H

Part 4 (three terms)		*Credits*	*Level*
Compulsory modules			
SE4P6	*MEng Research Project*	40	M
Optional modules must be chosen to give a total of 120 credits. These must be chosen from the following except, subject to timetabling restrictions, students can also choose up to 20 credits of Part 3 optional modules they have not already taken.			
CY4B2	*Mind as Motion*	10	M
CY4D2	*Terahertz Technology*	10	M
CY4F8	*Swarm Intelligence and Artificial Life*	10	M
CY4I7	*Biomechanics*	10	M
CY4J2	*Manipulator Robotics*	10	M
CY4K7	*Learning Classifier Systems*	10	M
CY4M8	*Medical Image and Signal Processing*	10	M
SE4G2	*Advanced Digital Signal Processing*	10	M
EE4H7	*Wireless Communication and Networking*	20	M
EE4M6	*Digital Motor Control*	10	M
MMM038	*Practice of Entrepreneurship*	20	M

Progression requirements

To gain a threshold performance at Part 1 and qualify for the CertHE a student shall normally be required to achieve an overall average of 40% over 120 credits taken in Part 1, where all the credits are at C level or above, and a mark of at least 30% in individual modules amounting to not less than 100 credits. In order to progress from Part 1 to Part 2, a student shall normally be required to achieve a threshold performance at Part 1, and to have no module mark below 30%.

To gain a threshold performance at Part 2 and qualify for the DipHE a student shall normally be required to achieve an overall average of 40% over 120 credits taken in Part 2, and a mark of at least 30% in individual modules amounting to not less than 100 credits. In order to progress from Part 2 to Part 3, a student shall normally be required to achieve a threshold performance at Part 2 and achieve an overall average of 60% in the 120 credits taken in Part 2. A student whose average is below 60% may be qualified for the BEng Electronic Engineering and Cybernetics degree.

Summary of teaching and assessment
Teaching is organised in modules that typically involve lectures and tutorial or laboratory practicals. Most modules are assessed by a mixture of coursework and formal examination. Some modules, for instance the projects in Parts 3 and 4, are assessed only as coursework.

A student must obtain at least 40% in both their projects (CY3P2/EE3P2 and SE4P6) to be eligible for honours.

Part 2 contributes 20% of the final degree assessment, Parts 3 and 4 each contribute 40%.

Admission requirements
Entrants to this programme are normally required to have obtained:
Grade B or better in Combined Science and B or better in Mathematics at GCSE; and achieved
UCAS Tariff: 300 points with grade B or better in Maths and B or better in Physics or Electronics, or equivalent
International Baccalaureat: 32 points including 6 in Higher Mathematics; or
Irish Leaving Certificate: BBBBB, including B or better in Maths and in Physics

Admissions Tutor: Dr Will Browne

Support for students and their learning
University support for students and their learning falls into two categories. Learning support includes IT Services, which has several hundred computers, and the University Library, which across its three sites holds over a million volumes, subscribes to around 4,000 current periodicals, has a range of electronic sources of information and houses the Student Access to Independent Learning (S@IL) computer-based teaching and learning facilities. There are language laboratory facilities both for those students studying on a language degree and for those taking modules offered by the Institution-wide Language Programme. Student guidance and welfare support is provided by Personal Tutors, the Careers Advisory Service, the University's Special Needs Advisor, Study Advisors, Hall Wardens and the Students' Union.

Within the providing School additional support is given though practical laboratory classes. The development of problem-solving skills is assisted by appropriate assignment and project work. There is a Programme Adviser to offer advice on the choice of modules within the programme. Course handbooks are provided for each Part of the course: these give more details about the modules which make up the degree. In addition, the School of Systems Engineering produces a Handbook for Students, which provides general information about the staff and facilities within the school, and other aspects of the University.

Career prospects
Career prospects for Cybernetists and Electronic Engineers tend to be good as our courses are very relevant to today's high technology society. Some graduates join large companies, often IT based companies; others join smaller companies and consultancies; and some choose to further their research interests either in the School or at other Universities. Graduates from this programme may, after a period of professional experience, apply for Chartered Engineer status.

Opportunities for study abroad or for placements
N/A

Educational aims of the programme
The programme aims to develop the students' knowledge of the theory and practice of modern electronic engineering and cybernetics required for the educational requirements of the Engineering Council for Chartered Engineer status; to encourage their critical and analytical skills; and to develop their skills in applying theoretical concepts to the practice of electronic and cybernetic systems design; to provide experience of engineering practice; and to provide a firm foundation for a career in design, management, or research and development. The programme is distinctive in that it combines the interdisciplinary nature of cybernetics with electronic engineering.

Programme Outcomes

The programme provides opportunities for students to develop and demonstrate knowledge and understanding, skills, qualities and other attributes in the following areas:

Knowledge and Understanding

A. Knowledge and understanding of:	**Teaching/learning methods and strategies**
1. Appropriate mathematical techniques to help model and analyse systems, and to use mathematics as a tool for communicating results and concepts. 2. Science underlying both electronic engineering and cybernetic systems. 3. Information technology. 4. Design of systems, including relevant design methods, and the use of appropriate technology. 5. Management and business practices, including finance, law, marketing and quality control 6. Engineering practice.	The knowledge required for the basic topics is obtained via lectures, tutorials, laboratory practicals, assignments and project work. Appropriate IT packages are taught. Demonstrators in laboratory and project supervisors advise students, and feedback is provided on all continually assessed work. As the course progresses, students are expected to show greater initiative and undertake independent research. *Assessment* Most knowledge is tested through a combination of practicals, assignments and formal examinations (open book in parts 3 and 4): students write reports on most assignments after part 1, and oral presentations also contribute.

Skills and other attributes

B. Intellectual skills – able to:	**Teaching/learning methods and strategies**
1. Select and apply appropriate scientific principles, mathematical and computer based methods for analysing general cybernetic systems. 2. Analyse and solve cybernetic and electronic engineering problems. 3. Be innovative and creative. 4. Organise tasks into a structured form. 5. Understand the evolving state of knowledge in a rapidly developing area. 6. Transfer appropriate knowledge and methods from one topic within the subject to another. 7. Plan, conduct and write a report on a project or assignment. 8. Prepare an oral presentation.	Appropriate mathematical, scientific and IT skills and tools are taught in lectures, and problems to be solved are given as projects or assignments. Project planning is part of the Part 3 project, and written and oral presentations are required for various assignments and projects. In the latter part of the course, some of the research in both electronic engineering and cybernetics is presented. *Assessment* 1-6 are assessed partly by examination, though sometimes also by project or assignment work. 7 and 8 are assessed as part of project work.

C. Practical skills – able to:

1. Use appropriate mathematical methods or IT tools.
2. Program a computer to solve problems.
3. Use relevant laboratory equipment and analyse the results critically.
4. Design, build and test a system.
5. Research into cybernetics and electronic engineering.
6. Manage projects.
7. Present work.

Teaching/learning methods and strategies

Mathematics and IT tools are introduced in lectures and their use is assessed by examinations and assignments.

Programming assignments are set, and students may write programs to solve other projects.

Laboratory practicals and projects are used to teach about 3, and projects are used for 4, 5, 6 and 7.

Assessment

1 and 5 are tested in coursework and in examinations. 2, 5 and 7 are tested by assignments and projects, 3 is assessed in practicals and sometimes in projects, 4, 5 and 6 are assessed through project work.

D. Transferable skills – able to:

1. Use IT tools.
2. Acquire, manipulate and process data.
3. Use creativity and innovation.
4. Solve problems.
5. Communicate scientific ideas.
6. Give oral presentations.
7. Work as part of a team.
8. Use information resources.
9. Manage time.

Teaching/learning methods and strategies

Some IT tools are taught in lectures, but most through laboratory sessions and assignments. Data skills are acquired in laboratory and projects. Creativity, innovation and problem solving are experienced through projects, as are team working, time management and presentations. Use of information resources, such as the library and IT methods, is experienced through projects and assignments.

Assessment

Some skills, like the use of IT tools and the ability to communicate orally and in written form are directly assessed, in assignments or projects, other skills are not directly assessed but their effective use will enhance the students overall performance.

Please note - This specification provides a concise summary of the main features of the programme and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. More detailed information on the learning outcomes, content and teaching, learning and assessment methods of each module can be found in the module description and in the programme handbook. The University reserves the right to modify this specification in unforeseen circumstances, or where the process of academic development and feedback from students, quality assurance processes or external sources, such as professional bodies, requires a change to be made. In such circumstances, a revised specification will be issued.