BEng Electronic Engineering and Cybernetics **UCAS code:**
For students entering Part 1 in 2010/1

Awarding Institution:	University of Reading
Teaching Institution:	University of Reading
Relevant QAA subject Benchmarking group(s):	Engineering
Faculty:	Science Faculty
Programme length:	3 years
Date of specification:	20/Apr/2012
Programme Director:	Eur Ing Dr R. Simon Sherratt
Programme Advisor:	Dr Richard Mitchell Dr John Bowen
Board of Studies:	UG Systems Engineering
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; 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. The programme is distinctive in that it combines the interdisciplinary nature of cybernetics with electronic engineering.

Transferable skills
During the course of their studies at Reading, all students will be expected to enhance their academic and personal transferable skills in line with the University's Strategy for Learning and Teaching. In following this programme, students will have had the opportunity to develop such skills, in particular relating to communication, interpersonal skills, learning skills, numeracy, self-management, use of IT and problem-solving and will have been encouraged to further develop and enhance the full set of skills through a variety of opportunities available outside their curriculum.

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)
Compulsory modules

Code	*Module title*	*Credits*	*Level*
SE1CA9	Cybernetics and its Application	20	4
SE1CB9	Engineering Mathematics	20	4
SE1EA5	Electronic Circuits	20	4
SE1EB9	Computer and Internet Technologies	20	4
SE1SA5	Programming	20	4
SE1SB9	Software Engineering	20	4

Part 2 (three terms)
Compulsory modules

Code	*Module title*	*Credits*	*Level*
SE2SM11	System Design and Project Management	20	5
SE2SP11	Signal Processing	20	5
SE2EM11	Embedded Microprocessors and Digital Systems	20	5
SE2CS11	Control Systems	10	5

SE2PL11	Programmable Logic and HDLs	10	5
SE2SD11	Sensors and Devices	10	5
SE2NN11	Neural Networks	10	5
SE2TE11	Telecommunications	10	5

Optional modules
Choose 10 credits from:

SE2CA11	Computer Architecture	10	5
SE2RM11	Robots and Mechanics	10	5
SE2RS11	Robotic Systems	10	5

Part 3 (three terms)
Compulsory modules

Mod Code	*Module Title*	*Credits*	*Level*
SE3IP11	Individual Project	40	6
SE3SL11	Social, Legal and Ethical Aspects of Science and Engineering	10	6
SE3SI11	System Identification and Control	20	6

Optional modules
Select modules worth 50 credits from:

SE3LM11	Law and Management	10	6
SE3CN11	Computer Networking	20	6
SE3MH11	Modern Heuristics	10	6
SE3ME11	Mechatronics	10	6
SE3MM11	Machines in Motion	10	6
SE3VR11	Virtual Reality	10	6
SE3MA11	Multi Agent Systems	10	6
SE3IA11	Image Analysis	10	6
SE3SE11	Sustainable Electrical Energy	10	6
SE3MS11	Measurement Systems	10	6
SE3AE11	Analogue Electronics	10	6
SE3BI11	Bionics	10	6
SE3NS11	Network Security	10	6
LA1XX1	Institution Wide Language Programme	20	4

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 4 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. A student whose average is 60% or greater may be qualified for the MEng Electronic Engineering and Cybernetics degree.

A student must obtain at least 40% in their year 3 project (SE3IP11) to be eligible for honours.

Part 2 contributes one third of the final degree assessment and Part 3 contributes two thirds.

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 Part 3 project, are assessed only as coursework.

Admission requirements
Entrants to this programme are normally required to have obtained:
Grade B or better in Combined Science and grade B or better in Mathematics at GCSE;
and achieved
UCAS Tariff: 260 points with grade C or better in Maths and C or better in Physics or Electronics, or equivalent
International Baccalaureat: 30 points including 6 in Higher Mathematics.
Equivalent qualifications are acceptable.

Admissions Tutor: Dr B Potter

Support for students and their learning
University support for students and their learning falls into two categories. Learning support is provided by a wide array of services across the University, including: the University Library, the Student Employment, Experience and Careers Centre (SEECC), In-sessional English Support Programme, the Study Advice and Mathematics Support Centre teams, IT Services and 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, School Senior Tutors, the Students' Union, the Medical Practice and advisers in the Student Services Centre. The Student Services Centre is housed in the Carrington Building and offers advice on accommodation, careers, disability, finance, and wellbeing. Students can get key information and guidance from the team of Helpdesk Advisers, or make an appointment with a specialist adviser; Student Services also offer drop-in sessions and runs workshops and seminars on a range of topics. For more information see www.reading.ac.uk/student

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, together with other appropriate educational requirements, apply for Chartered Engineer status.

Opportunities for study abroad or for placements
N/A

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 2. Science underlying both electronic engineering and cybernetic systems. 3. Information technology. 4. Systems design. 5. Management and business practices, including finance, law, marketing and quality control.	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

6. Engineering practice.	show greater initiative and undertake independent research. *Assessment* Most knowledge is tested through a combination of practicals, assignments and formal examinations (open book in part 3): 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 and electronic engineering systems. 2. Analyse and solve cybernetic and electronic engineering problems. 3. Be 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 between topics in both electronic engineering and cybernetics. 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:*	**Teaching/learning methods and strategies**
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. Use project management methods. 7. Present work.	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:*	**Teaching/learning methods and strategies**
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.	Some IT tools are taught in lectures, but most through laboratory sessions and assignments. Data skills are acquired in laboratory practicals and projects. Creativity 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 process or external sources, such as professional bodies, requires a change to be made. In such circumstances, a revised specification will be issued.