BEng Electronic Engineering   **UCAS code: H610**
For students entering Part 1 in 2015/6

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:	01/Sep/2015
Programme Director:	Dr John Bowen
Programme Advisor:	Prof Simon Sherratt
	Dr Oswaldo Cadenas
	Prof Paul Sharkey
Board of Studies:	UG Systems Engineering
Accreditation:	Institution of Engineering and Technology (IET)
	Institute of Measurement and Control (InstMC)

Summary of programme aims

To develop the students' knowledge of the theory and practice of modern electronic engineering, necessary for them to secure employment as professional electronic engineers in a wide variety of industries and to also meet partial educational requirements set out by ECUK for Chartered Engineer status (further learning to Masters level is currently required by ECUK). A full statement of the educational aims and learning outcomes of the programme is given later.

Transferable skills

During the course of their studies at Reading, all students will be expected to enhance their academic and personal transferable skills. 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
SE1PR11	Programming	20	4
SE1SE11	Software Engineering	20	4
SE1FA15	Fundamentals and Applications of Computing	20	4
SE1CY15	Cybernetics	20	4
SE1MA15	Mathematics	20	4
SE1EE15	Electronics	20	4

Part 2 (three terms)
Compulsory modules

Mod Code	Module Title	Credits	Level
SE2SM11	Systems 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
SE2CA11	Computer Architecture	10	5
SE2SD11	Sensors and Devices	10	5
SE2TE11	Telecommunications	10	5

Optional modules:

SE2NN11	Neural Networks	10	5
SE2RM11	Robots and Mechanics	10	5
SE2RS11	Robotic Systems	10	5

Part 3 (three terms)
Compulsory modules

Code	*Module title*	*Credits*	*Level*
SE3IP11	Individual Project	40	6
SE3SL11	Social, Legal and Ethical Aspects of Science and Engineering	10	6
SE3UI11	USB Integration	10	6
SE3CN11	Computer Networking	20	6

Optional modules
Select modules worth 40 credits from:

SE3LM11	Law and Management	10	6
SE3SI13	System Identification and Control	10	6
SE3SS13	State Space and Frequency Response	10	6
SE3ME11	Mechatronics	10	6
SE3IA11	Image Analysis	10	6
SE3SE11	Sustainable Electrical Energy	10	6
SE3MS11	Measurement Systems	10	6
SE3AE11	Analogue Electronics	10	6

Progression requirements
In order to progress from Part 1 to Part 2, a student shall normally be required to achieve the following at Part 1:
• an overall weighted average of 40% over 120 credits; and
• a mark of at least 40% in individual modules amounting to not less than 100 credits; and
• a mark of at least 30% in individual modules amounting to not less than 120 credits.
Students who have failed or are not qualified to progress to Part 2 are permitted one re-sit examination in each failed module. The mark used for the purposes of progression will be the higher of the mark obtained in the original examination and the mark obtained in the re-examination.
Students who do not meet the above requirement but gain a threshold performance at Part 1 may be eligible to transfer to another programme or to leave with a CertHE. To gain a threshold performance at Part 1 a student shall normally be required to achieve:
• an overall average of 40% over 120 credits taken in Part 1; 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 the following in Part 2:
• an overall weighted average of at least 40% over 120 credits; and
• a mark of at least 40% in individual modules amounting to not less than 100 credits; and
• a mark of at least 30% in individual modules amounting to not less than 120 credits.
Students who fail to progress are permitted one re-sit examination in each module in which they obtain less than 40%. For any module attempted in a re-sit examination the maximum mark carried forward into the final degree classification will be the higher of (a) the first attempt mark and (b) the lower of 40 and the mark achieved in the re-examination.
Students who do not meet the above requirements for progression to Part 3 but gain a threshold performance may be eligible to transfer to another programme or leave with a DipHE. To gain a threshold performance at Part 2 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 40% in individual modules amounting to not less than 80 credits; and

- a mark of at least 30% in individual modules amounting to not less than 120 credits.

To be eligible for honours, a student shall normally be required to have satisfied all of the above progression requirements and to achieve the following in Part 3:
In order to graduate with the industrial year variant of the degree students are required to achieve an average of at least 40% in their industrial placement (module SE2W9 BSc CYwIY, BEng EEwIY and BSc Robotics wIY). Otherwise students will be eligible for the 'non Industrial Year' degree.
Students must achieve a 2:2 or above in order to graduate with an accredited degree.
Students who fail the degree are permitted one re-sit examination (for a Pass degree) in each Part 3 module in which they have achieved less than 40%. For any such module attempted in a re-examination, the mark carried forward into the final degree assessment will be the higher of the original mark and the mark in the re-examination.
- a mark of at least 40% in individual modules amounting to not less than 80 credits;
- a mark of at least 40% at first attempt in the Part 3 major project module.

Summary of Teaching and Assessment
The University's Honours classification scheme is:

Mark	Interpretation
70% - 100%	First class
60% - 69%	Upper Second class
50% - 59%	Lower Second class
40% - 49%	Third class
35% - 39%	Below Honours Standard
0% - 34%	Fail

For the University-wide framework for classification, which includes details of the classification method, please see: www.reading.ac.uk/internal/exams/Policies/exa-class.aspx

The weighting of the Parts/Years in the calculation of the degree classification is

Three-year programmes
Part 2 one-third
Part 3 two-thirds

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, in particular the Part 3 are assessed only as coursework. Details are given in the relevant module description.

Admission requirements
Entrants to this programme are normally required to have obtained:
Grade C or better in English in GCSE; and achieved
Grades BBB in three A Level subjects including Mathematics and Physics or Electronics; or
International Baccalaureat: 30 points overall including 5,5 in Mathematics and Physics both at higher level;

Admissions Tutor: Dr Etienne Roesch

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 Careers, Placement and Experience Centre (CPEC), 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, academic issues (eg problems with module selection) and exam related queries. 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 Course 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.

Career learning
In the School of Systems Engineering (SSE), students are given strong support on career management/learning throughout their course.
- Students are introduced to the Placement & Careers Team in their fresher's week, where they receive information of how the team supports their Careers/Placement.
- At the end of their first year all students attend a one week intensive course, where a combination of presentations and workshops take place in: Placement/Graduate Job Search & using Social Media, Application Preparation & Research, Writing CV's & Covering Letters and completing Application Forms, Psychometric Testing (Numerical, Verbal & Diagrammatical Reasoning Tests), Competency Based Interviewing, Group Exercises & Presentations and Placement Presentations from 40+ employers.
- In the second year, students are prepared and encouraged to apply for a placement (either a three month summer Internship or a 12 month Industry placement).
- In the final year, students' graduate applications are supported by the Placement & Career Team with the following activities:
1. Organising an SSE Placement/Graduate Fair & Company presentations and source Placement & Graduate positions and send these out to the students
2. Arranging on site Interviews, Selection Skill Workshops with Employers & Placement Team
3. 1 - 1 Career/Placement support meetings (Monday & Tuesday 9:30 to 12 and Thursday 2 to 4:30 pm)

Career prospects
In recent years most students who have followed this programme have gone into jobs involving electronic systems design. These include manufacturers of mobile phones, computers, computer networking products, and integrated circuits. Others have joined research groups in university and industry, the public service, and the teaching professions. Graduates from this programme are partially exempt (at 2:2 Hons or above) from the academic requirements for Chartered Engineer under UK-SPEC, but can apply for membership of the Institution of Electrical Engineers. After a period of professional development (order of 4 years) and further learning to masters level, a graduate can expect to achieve Chartered Engineer status.

Opportunities for study abroad
As part of the degree programme students have the opportunity to study abroad at an institution with which the University has a valid agreement.

Placement opportunities
Students who wish to undertake a year-long industrial placement may be eligible to transfer to the BEng Electronic Engineering with Industrial Year. The placement year normally takes place between Parts 2 and 3 of this degree programme.

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 use mathematics as a tool for communicating results and concepts.	The knowledge required for the basic topics is obtained via lectures, tutorials, laboratory practicals, assignments and project work.
2. Science underlying Electronic Engineering	Appropriate IT packages are taught.

systems.
3. Information technology.
4. Design of electronic engineering systems, including the methods of applying engineering principles to create new products and systems, but including the constraints in applying inappropriate technology and the needs of commercial risk evaluation.
5. Management and business practices, including finance, law, marketing and quality control
6. Electronic Engineering practice.

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: students write reports on most assignments after Part 1, and oral presentations are also assessed.

Skills and other attributes

B. Intellectual skills - *able to:*

1. Select and apply appropriate scientific principles, mathematical and computer based methods for analysing general electronic engineering systems.
2. Analyse and solve 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 in electronic engineering to another.
7. Plan, conduct and write a report on a project or assignment.
8. Prepare an oral presentation.

Teaching/learning methods and strategies

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.
Creativity and innovation is embedded into the course, in laboratory classes and project work.

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 electronic engineering problems.
6. Manage projects effectively.
7. Present work both in written and oral form, using appropriate technology.

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 process or external sources, such as professional bodies, requires a change to be made. In such circumstances, a revised specification will be issued.