BSc Systems Engineering

UCAS code: H650

For students entering Part 1 in 2007

Awarding Institution: The University of Reading
Teaching Institution: The University of Reading
Relevant QAA subject benchmarking group(s): Engineering
Faculty of Science
Programme length: 3 years
Date of specification: 24/03/09
Programme Director: Dr R.J.Mitchell
Programme Advisers: Dr J.W.Bowen (Cyb), Dr R.S.Sherratt (EE), Dr G.T.McKee(CS)
Board of Studies: Computer Science and Cybernetics
Accreditation: None.

Summary of programme aims

The programme comprises modules in Computer Science, Cybernetics, Electronic Engineering and Information Systems, the four subjects of the School of Systems Engineering. The key feature is that students are given as much freedom as possible to make a degree programme, in the area of Systems Engineering, which contains topics of interest to the student. In addition to providing information on these topics, the degree also aims to impart skills in the assimilation of technically complex material, team working, meeting deadlines, the production of clearly written reports, and to introduce some current research. (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 such 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 below states which modules must be taken (the compulsory part). Students must choose additional modules as they wish, in consultation with their programme adviser, to make 120 credits in each Part. The credit for each module is shown in the second column from the right. The codes C, I, H or M in the right most column show the level of each module.

		Part 1 (three terms)	*Credits*	*Level*
Compulsory modules				
	SE1SA5	*Programming*	20	C
	SE1SB5	*Software Engineering*	20	C
	SE1EB5	*Computer and Internet Technologies*	20	C
and	SE1CB5	*Engineering Mathematics*	20	C
or	MA116	*Maths for Computer Scientists*	20	C
Optional modules				
	SE1CA5	*Cybernetics and Its Application*	20	C
	SE1EA5	*Electronic Circuits*	20	C
	SE1SC5	*Computer Science Roadmap*	20	C

Part 2 (three terms)			*Credits*	*Level*
Compulsory modules				
	SE2P6	*Engineering Applications*	20	I
or	CS2F7	*Object Oriented Design*	10	I

Optional modules must be chosen to give a total of 120 credits. These modules may be any Part 2 module offered by Systems Engineering (with code beginning CS, CY, EE or SE), for which the student meets the appropriate pre-requisites, subject to timetabling limitations.

Part 3 (three terms)			*Credits*	*Level*
Compulsory modules				
	CS3Q2	*Computer Science Project*	30	H
or	CY3P2	*Cybernetics Project*	30	H
or	EE3P2	*Electronic Engineering Project*	30	H

Optional modules must be chosen to give a total of 120 credits. These modules may be any Part 3 module offered by Systems Engineering, for which the student meets the appropriate pre-requisites, subject to timetabling limitations. A foreign language module may also be chosen.

In addition, although the course is not accreditable, as most degrees in the School are accredited, a student may be able to apply directly to a professional body as a special case; if such a course of action is likely to be followed, it is recommended that the student chooses the following:

SE3Z5	*Social, Legal and Ethical Aspects of Science and Engineering*	20	H

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.

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.

A student must obtain at least 40% in their project, CS3Q3, CY3P2 or EE3P2, to be eligible for honours.

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

On the Compulsory Modules

The compulsory modules in Part 1 are those which are compulsory for many of the degrees in the School. Thus, by careful choice of the options it is possible to do the compulsory modules for many degrees in the School, as well as meeting the pre-requisites for many modules in Part 2.

In Part 2, students must choose one of the 3 modules which provide presentation skills and career management skills, otherwise there is free choice of the modules for which they are qualified.

In Part 3, students must do a project, from one of the three subject areas (though projects often transcend the subject boundaries), and it is recommended that they the module which provides material on management, law, etc., which may help should they apply for chartered engineering status. Otherwise, there is free choice.

Advice on Module Choice
In the Part 1 handbook there is a table showing which modules are needed for each School degree, and for subsequent Parts there is information on which modules are required for other modules. These sets of information, together with advice from a Programme Advisor, will enable students to make an informed decision on the optional modules in the degree.

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 Mathematics and Physics, or equivalent
International Baccalaureat: 29 points including 6 in Higher Mathematics.
Equivalent qualifications are acceptable.

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 Systems Engineers tend to be good as the courses are very relevant to today's high technology society and, because the courses are not dependent upon any one industry, graduates are employed in a variety of areas. 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.

Opportunities for study abroad or for placements
N/A

Educational aims of the programme
The programme comprises modules in Computer Science, Cybernetics, Electronic Engineering and Information Systems, the four subjects in the School of Systems Engineering, and students can choose those modules for which they are qualified which are of interest. The programme aims to provide an understanding of systems engineering; to appreciate relevant modern technology and techniques; to produce good practically oriented engineers whose systems grounding allows them to work in an industrial or academic environment, as individuals or as part of a team. The programme is distinctive in that students are given as much freedom as possible to make a degree programme, in the area of Systems Engineering, which contains topics of interest to the student.

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 engineering systems. 3. Information technology. 4. Systems design. 5. 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 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 systems. 2. Analyse and solve 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 from one topic in Systems Engineering 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 Systems Engineering 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 systems engineering problems.
6. Use project management methods.
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 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.