BSc Computer Engineering

UCAS code: H611

Awarding Institution: The University of Reading
Teaching Institution: The University of Reading
Relevant QAA subject benchmarking group(s): Computing
Faculty of Science
Programme length: 3 years
For students entering Part 1 in 2002
Date of profile: May 2003
Programme Director: Prof R. Harrison
Programme Adviser: Dr GT McKee
Admissions Tutor: Dr A. Adams
Board of Studies: Computer Science
Accreditation: British Computer Society

Summary of programme aims

The programme combines traditional computer science and electronic engineering principles with good practice in design and project management applied to technically demanding problems. At the end of the course students should be capable of applying these skills to problems requiring the integration of software and hardware. There is an emphasis on team and group work, and the production of quality written reports. Graduates will be well qualified to play a disciplined and innovative part in research and development across the IT and Electronics sector.

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, together with one or more lists of modules from which the student must make a selection. Students must choose such additional modules as they wish, in consultation with their programme advisor, to make 120 credits in each part.

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Part 1 (three terms)

Compulsory modules		*Credits*
SE1A2	*Introduction to Computer Systems*	10 C
and either both		
CS1A2	*Programming 1*	10 C
CS1B2	*Programming 2*	10 C
or both		
CS1C2	*Introductory Programming 1*	10 C
CS1D2	*Introductory Programming 2*	10 C
and		
MA113	*Logic and Discrete Maths*	20 C
CS1G2	*Introduction to Algorithms*	10 C
CS1H2	*Functional Programming*	20 C
And either		
MA114	*Math. Foundations of Computer Science*	20 C
Or		
MA111	*Maths for Scientists*	20 C
Or both		
CY1A2	*Cybernetics and its Application*	20 C
And CY1B2	*Analysis of Cybernetic Systems*	20 C

If necessary, an option from (say) Modern Languages, to make 120 credits 20 C

Part 2 (three terms)

Compulsory modules		
CS2A2	*C and Compilers*	10 I
CS2B2	*Operating Systems*	20 I
CS2C2	*Computer Architecture*	10 I
CS2D2	*Databases*	10 I
CS2E2	*Software Engineering*	10 I
CS2G2	*Algorithmic Techniques*	20 I
EE2A2	*Embedded Microprocessor Systems*	20 I
EE2C2	*Digital Circuit Design*	10 I
EE2Q2	*IC Design*	10 I

Part 3 (three terms)

Compulsory modules		
CS3Z2	*Professional Aspects of CS and IT*	20 H
SE3Q2	*Computer Engineering Final Year Project*	30 H
EE3B2	*Advanced Digital Design*	10 H
CS3A2	*Computer Networking*	10 H

Optional modules (a total of 50 credits to be chosen):

CS3B2	*GUI, Web & Multimedia Design*	10 H
CS3E2	*Distributed Systems*	10 H
CS3F2	*XML Technologies and Applications*	10 H
CS3K2	*Advanced Compilers*	10 H
CS3L2	*Neural Computation*	10 H
CS3M2	*Evolutionary Computation*	10 H
CS3N2	*Software Quality Metrics*	10 H

CS3U2	*Image Processing and Vision*	10 H
CS3J2	*Computer Graphics I*	10 H
CS3D2	*Computer Graphics II*	10 H
CS3G2	*Computer Vision*	10 H
CS3W2	*Artificial Intelligence*	10 H
CS3X2	*Topics in Artificial Intelligence*	10 H
CS3Y2	*Robot Architectures*	10 H
SE3Z2	*Virtual Reality*	10 H
CS3TR4	*Informatics for E-Enterprise*	20 H

Progression requirements

To proceed to Part 2 students must:

- Achieve an overall average of 40% in 120 credits; and
- Achieve not less than 30% in the modules taken. *Marks of less than 30% in a total of 20 credits will be condoned provided that the candidate has pursued the course for the module with reasonable diligence and has not been absent from the examination without reasonable cause.*

To proceed from Part 2 to Part 3 students must:

- Achieve an overall average of 40% in 120 credits and
- Achieve not less than 30% in the modules taken. *Marks of less than 30% in a total of 20 credits will be condoned provided that the candidate has pursued the course for the module with reasonable diligence and has not been absent from the examination without reasonable cause.*

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

Summary of teaching and assessment

Teaching is organised in modules that typically involve lectures and tutorials or practicals. Most modules are assessed by a mixture of coursework and formal examination. Some modules such as the Part 3 project are assessed by coursework.

Admission requirements

Entrants to this programme are normally required to have obtained:

Grade B in Mathematics and Grade C in English in GCSE; and achieved
A level: 280 points with at least 2Cs in Mathematics and Physics; or International Baccalaureate: 30 points; or
GNVQ: Distinction in one of the following Advanced subject areas: Engineering or Information Technology or Science; and 6 additional GNVQ units including Mathematics; and one GCE AAS level (Mathematics preferred).
Scottish Highers: four grade Bs.
Irish Highers: four grade Bs and one grade C.

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 Department 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 Computer Science, Cybernetics and Electronic Engineering produces a Handbook for Students, which provides general information about the staff and facilities within the school.

Career prospects
Career prospects are good given the market for computer related skills. Graduates can find employment connected with the software industry, either in programming, consultancy or systems analysis and design. The combination of both software and hardware design skills widens the opportunities further. Some graduates continue in research either in the Department or at other Universities.

Opportunities for study abroad
The School of Computer Science, Cybernetics and Electronic Engineering participates in a Socrates exchange under which students can spend up to a year at the University of Picardy in northern France.

Educational aims of the programme
To develop the students' knowledge of the theory and practice of modern computer science, necessary for them to secure employment as professional software engineers in a wide variety of industries; to encourage their critical and analytical skills; and to develop their skills in applying theoretical concepts to the practice of computer systems design.

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:

1. software engineering and theoretical issues in Computer Science.
2. a range of programming languages and environments.
3. information technology.
4. appropriate mathematical techniques, including the use of mathematics as a tool for communicating results, concepts and ideas.
5. business context.
6. engineering practice.

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Teaching/learning methods and strategies
The knowledge required for the basic topics is obtained via lectures, exercises, practicals, assignments and project work.
Appropriate IT and other software packages are taught.
Practical demonstrators 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.

Assessment
Most knowledge is tested through a combination of practicals, assignments and formal examinations.
Students write reports on many assignments, and also make oral presentations of their work.

Skills and other attributes

B. Intellectual skills – able to:

1. select and apply appropriate computer based methods, mathematical and scientific principles for analysing general systems.
2. analyse and solve problems.
3. organise tasks into a structured form.
4. understand the evolving state of knowledge in a rapidly developing area.
5. transfer appropriate knowledge and methods from one topic within the subject to another.
6. plan, conduct and write a report on a project or assignment.
7. prepare an oral presentation.

Teaching/learning methods and strategies

Appropriate software, 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.

Assessment

Skills 1-5 are assessed partly by examination, though sometimes also by project or assignment work. Skills 6 and 7 are assessed as part of project work.

C. Practical skills – able to:

1. use appropriate software tools.
2. program a computer to solve problems.
3. use relevant software and analyse the results critically.
4. design, build and test a system.
5. research into computer science problems.
6. utilise project management methods.
7. present work both in written and oral form.

Teaching/learning methods and strategies

Software 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.
Practicals and projects are used to teach about skill 3, and projects are used for skills 4, 5, 6 and 7.

Assessment

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

D. Transferable skills – able to:

1. use software 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

Software tools are taught partly in lectures, mainly through practical sessions and assignments.
Data skills are acquired in laboratory and projects.
Creativity and innovation and problems 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 software tools and 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 expect 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 module and programme handbooks.