

# BSc in Applied Computer Science and Cybernetics UCAS code: GH4P

Awarding Institution: The University of Reading  
Teaching Institution: The University of Reading  
Relevant QAA subject benchmarking group(s): Computing  
Faculty of Science Programme length: 4 years  
For students entering Part 1 in 2004 Date of profile: 02/03/06  
Programme Director: Dr. V.F.Ruiz  
Programme Adviser: Dr R.J.Mitchell (Cybernetics), Dr G.T.McKee (Computer Science)  
Board of Studies: Computer Science and Cybernetics  
Accreditation: British Computer Society

## Summary of programme aims

The programme combines a sound understanding of computer science and cybernetics. It aims to impart skills in the assimilation of technically complex material, team working, meeting deadlines, and the production of clearly written reports. (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 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. The number of credits for each module is shown in the second column from the right, and the level C, I or H is shown in the rightmost column.

### Part 1 (three terms)

#### Compulsory modules

		<i>Credits</i>	<i>Level</i>
	CY1A2 <i>Cybernetics and Its Application</i>	20	C
	SE1A2 <i>Introduction to Computer Systems</i>	10	C
	CS1G2 <i>Introduction to Algorithms</i>	10	C

#### and either both

	SE1B2 <i>Systems and Circuits</i>	20	C
	EG1C2 <i>Engineering Mathematics</i>	20	C
or	CY1B2 <i>Analysis of Cybernetic Systems</i>	20	C

#### and either

	CS1A2 <i>Programming 1</i>	10	C
&	CS1B2 <i>Programming 2</i>	10	C
or	CS1C2 <i>Introductory Programming 1</i>	10	C
&	CS1D2 <i>Introductory Programming 2</i>	10	C

#### Optional modules - choose modules worth a further 20 or 40 credits, to have a total of 120 credits

	CS1H2 <i>Functional Programming</i>	20	C
	MA113 <i>Logic and Discrete Maths</i>	20	C
	EE1A2 <i>Electronic Devices and Telecoms</i>	20	C
	<i>Institution Wide Language Programme</i>	20	C

<b>Part 2 (three terms)</b>		<i>Credits</i>	<i>Level</i>	
<i>Compulsory modules</i>				
CS2D2	<i>Databases</i>	10	I	
CS2E2	<i>Software Engineering</i>	10	I	
CS2G2	<i>Algorithmic Techniques</i>	20	I	
CY2B2	<i>Further Cybernetic Systems</i>	20	I	
CY2D2	<i>Neurocomputation</i>	20	I	
CY2G2	<i>Signals</i>	10	I	
SE2B2	<i>Further Computer Systems</i>	20	I	
SE2R2	<i>Transferable Skills</i>	10	I	
<b>Industrial year (three terms)</b>		<i>Credits</i>	<i>Level</i>	
<i>Compulsory modules</i>				
CS2S2	<i>Industrial year</i>	120	I	
<b>Part 3 (three terms)</b>		<i>Credits</i>	<i>Level</i>	
<i>Compulsory modules</i>				
	CY3A2	<i>Computer Controlled Feedback Systems</i>	20	H
	SE3Z5	<i>Social, Legal and Ethical Aspects of Science and Engineering</i>	20	H
<b>&amp;</b>	CS3Q2	<i>Computer Science Project</i>	30	H
<b>or</b>	CY3P2	<i>Cybernetics Project</i>	30	H
<i>Optional modules must be chosen to give a total of 120 credits:</i>				
	CY3B2	<i>Machine Intelligence</i>	10	H
	CY3F2	<i>Virtual Reality</i>	10	H
	CY3G2	<i>Modern Heuristics</i>	10	H
	CY4E2	<i>Bionics</i>	10	M
	CY4J2	<i>Manipulator Robotics</i>	10	M
	CY3L2	<i>Mechatronics</i>	10	H
	CS3A2	<i>Computer Networking</i>	10	H
	CS3B2	<i>GUI, Web and Multimedia Design</i>	10	H
	CS3F6	<i>XML &amp; Semantic Web Technologies &amp; Applications</i>	10	H
	CS3M6	<i>Evolutionary Computation</i>	10	H
	CS3E6	<i>Distributed Computing</i>	10	H
	CS3G2	<i>Computer Vision</i>	10	H
	CS3U2	<i>Linear Algebra for Computer Vision and Robotics</i>	10	H
	CS3J2	<i>Computer Graphics I</i>	10	H
	CS3D2	<i>Computer Graphics II</i>	10	H
	CS3Y2	<i>Robotic Architectures</i>	10	H
	CS3W2	<i>Artificial Intelligence</i>	10	H
		<i>Language from IWLP</i>	20	H

### **Progression requirements**

In order to progress from Part 1 to Part 2 students must:

- Achieve an overall average of 40% in 120 credits taken in Part 1; and
- Achieve not less than 30% in the compulsory modules taken in Part 1.

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 Computer Science 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 example the Part 3 project, are assessed only as coursework. Details are given in the relevant module description.

To be eligible for Honours, students must obtain an overall average mark of at least 40% **and** at least 40% in the Part 3 project, and submit a satisfactory report on the industrial year module to be eligible for the Applied Degree. In the eventuality of a failure to submit a satisfactory report on the industrial year students are eligible for the non applied version of their degree programme.

Part 2 and Part 3 contribute to the final degree assessment in the ratio 1:2

## **Admission requirements**

Entrants to this programme are normally required to have obtained:

A minimum of GCSE: Mathematics Grade B or higher and Combined Science Grade B or higher.  
UCAS Tariff: 260 points with a grade C or higher in Mathematics or science subject.

International Baccalaureate: 30 points; or

Irish Leaving Certificate: BBBCC, with a Grade B or higher in Mathematics or science subject.

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 are 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 through practical laboratory classes. The development of problem-solving skills is assisted by appropriate assignment and project work. There is a Course Advisor 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 prospects**

Career prospects are good, as the programme is very relevant to today's high technology society. Most graduates find employment connected with the software industry, either in programming, consultancy or systems analysis and design. Some graduates choose to further their research interests either in the Department or at other universities.

## **Opportunities for study abroad**

N/A

## **Educational aims of the programme**

The programme aims to combine an understanding of computer science and cybernetics, with a knowledge of relevant modern technologies, theories and techniques; to produce good practically oriented graduates able to work in an academic, research or industrial environment, as individuals or as part of a team. This programme is distinctive in that it gives an overview of both computer science and cybernetics.

Many students find that the experience and knowledge gained during the Industrial Year allows them to make better use of their final year of University study, and provides useful background knowledge for more permanent career choices.

### 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*

<p><b>A. Knowledge and understanding of:</b></p> <ol style="list-style-type: none"> <li>1. computer science and cybernetics</li> <li>2. information technology (IT)</li> <li>3. appropriate mathematical techniques, including the use of mathematics as a tool for communicating results, concepts and ideas</li> <li>4. business context</li> <li>5. engineering practice</li> </ol>	<p><i>Teaching/learning methods and strategies</i></p> <p>The knowledge required for 1-5 (see left) is obtained via lectures, tutorials, laboratory practicals, assignments and project work. Appropriate IT packages are taught. Laboratory 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. The year spent in industry gives students a first hand knowledge of the business context.</p> <p><i>Assessment</i></p> <p>Most knowledge is tested through a combination of practicals, assignments and formal examinations. Students write reports on many assignments after Part I, and may also make oral presentations of their work.</p>
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#### *Skills and other attributes*

<p><b>B. Intellectual skills – able to:</b></p> <ol style="list-style-type: none"> <li>1. select and apply appropriate computer based methods, mathematical and scientific principles for analysing computer and cybernetic systems</li> <li>2. analyse and solve problems</li> <li>3. organise tasks into a structured form</li> <li>4. understand the evolving state of knowledge in a rapidly developing area</li> <li>5. transfer appropriate knowledge and methods from one topic with in the subject to another</li> <li>6. plan, conduct and write a report on a project or assignment</li> <li>7. prepare an oral presentation.</li> </ol>	<p><i>Teaching/learning methods and strategies</i></p> <p>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 included in the Part 3 project, and written and oral presentations are required for various assignments and projects.</p> <p><i>Assessment</i></p> <p>Skills 1-5 are assessed partly by examination and partly by project or assignment work. Skills 6 and 7 are assessed as part of project work.</p>
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**C. Practical skills** – able to:

1. use appropriate mathematical 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. utilise project management methods.
6. present work both in written and oral form.
7. manage projects effectively

*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 as part of other projects. Laboratory practicals and projects are used to teach skill 3 and projects are used for skills 4-8.

*Assessment*

Skill 1 is tested in coursework and in examinations. Skills 2, 4 and 6 are tested by assignments and projects, 3 is assessed in practicals and sometimes in projects, Skills 4-7 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*

IT tools are taught partly in lectures, mainly through practical sessions and assignments. Data skills are acquired in laboratory and projects. Creativity and 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 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.**