MSc Cybernetics
For students entering in 2006

Awarding Institution: The University of Reading
Teaching Institution: The University of Reading
Relevant QAA subject benchmarking group(s): Engineering
Faculty of Science Programme length: 1, 2, or up to 5 years
Date of profile: 10/08/06
Programme Director: Dr V.M. Becerra
Programme Advisers: Prof. P. Sharkey, Dr. R. Mitchell, Dr. V.F. Ruiz (Cybernetics)
Board of Studies: Cybernetics
Accreditation: N/A

Summary of programme aims
The programme aims to provide a thorough postgraduate Master's education in Cybernetics, covering both the technological and biological aspects of the subject, thus reflecting Wiener's definition that Cybernetics applies both to the 'animal and the machine'. (For a full statement of the programme aims and learning outcomes see below)

Transferable skills
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 and time-management.

Programme content
The profile which follows states which module 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 optional modules, in consultation with the Programme Director, and according to the restrictions given below, to make 120 credits in Part 1. The number of modules credit for each module is shown after its title.

Part 1 (two terms full time or four terms part-time)		*Credits*	*Level*
Optional modules – choose modules worth at most 50 credits from the following			
CY3C2	*State Space*	10	H
CY3D2	*Measurement Systems*	10	H
CY3E2	*Biological Cybernetics*	10	H
CY3G2	*Modern Heuristics*	10	H
CY3A2	*Computer Controlled Feedback Systems*	20	H
CY3H2	*Non-Linear Control*	10	H
CY3L2	*Mechatronics*	10	H
CY3F2	*Virtual Reality*	10	H
Optional modules – choose modules worth at least 70 credits from the following			
CY4A2	*Advanced Control*	20	M
CYMN2	*Neural Networks*	10	M
CY4B2	*Mind as Motion*	10	M
CY4D2	*Terahertz Technology*	10	M
CY4E2	*Bionics*	10	M
CY4G2	*Biomedical Instrumentation*	10	M
CY4I2	*Biomedical Engineering*	10	M
CY4J2	*Robotics*	10	M
CYMS2	*Signal Processing*	10	M

Part 2 (six months full time or 18 months part-time)		*Credits*	*Level*
Compulsory module			
CYMP2	*MSc dissertation*	60	M

Part-time/Modular arrangements

Part-time students will be able to take the taught element of the MSc in the Autumn and Spring terms over two consecutive academic years. The MSc project for part-time students will start in April of the first year of registration and will end in September of the second year of registration.

In addition to the full-time and two year part-time options, the programme is offered on a flexible modular basis, giving the opportunity to individuals who are in full-time employment to gain an MSc in Cybernetics (180 credits, including a dissertation), a Postgraduate Diploma (120 credits) or a Certificate (60 credits), or to take the taught modules as free-standing CPD courses. Students in the flexible mode will have a maximum of five years to earn up to 180 credits.

The award of the Postgraduate Certificate and the Postgraduate Diploma will be dependent upon the successful completion of 60 credits and 120 credits, respectively, of the course at the same pass marks as for the Masters Degree. Because of the nature of the flexible modular option, students may be awarded the Postgraduate Certificate or Diploma at the termination of any appropriate module.

The maximum study period of five years will allow candidates considerable flexibility in achieving a postgraduate award while continuing to pursue a full-time career in industry. The flexible modular students will take their choice of modules together with the full-time students over the Autumn and Spring terms of each academic year. Each taught module typically involves two hours of lectures per week. 10-credit modules are typically taught over one term (Autumn or Spring), while 20-credit modules are typically taught over two terms (Autumn and Spring).

It is also possible to take the taught modules as free-standing training courses and enroll on one of two different basis:

i. Continuing Professional Development (CPD) undertaking no assessment;

ii. as a module with assessment which would then contribute towards a postgraduate qualification (MSc, Diploma, or Certificate).

Progression Requirements

To pass the MSc students must gain an average mark of 50% or more overall including a mark of 50% or more for the dissertation. In addition, the total credit value of all modules marked below 40% must not exceed 30 credits and for all modules marked below 50% must be less than 60 credits[1].

Students who gain an average mark of 70% or more overall including a mark of 60% or more for the dissertation and have no mark below 40% will be eligible for a Distinction. Those gaining an average mark of 60% or more overall including a mark of 50% or more for the dissertation and have no mark below 40% will be eligible for a Merit.

[1] The provision to permit a candidate to be passed overall with a profile containing marks below 40 is made subject to the condition that there is evidence that the candidate applied his or herself to the work of those modules with reasonable diligence and has not been absent from the examination without reasonable cause.

The University's taught postgraduate marks classification is as follows:

Mark	Interpretation
70 – 100%	Distinction
60 – 69%	Merit
50 – 59%	Good standard (Pass)
Failing categories:	
40 – 49%	Work below threshold standard
0 – 39%	Unsatisfactory Work

Summary of teaching and assessment

Teaching is organised in modules that typically involve lectures and tutorial or laboratory sessions. Most modules are assessed by a mixture of coursework and formal examination. Some modules are assessed only as coursework. Details are given in the relevant module description.

Admission requirements

Undergraduate Degree

At least a 2.2 Honours UK BSc/BEng degree or overseas equivalent

Degree Discipline

Electrical Engineering, Electronic Engineering, Mechanical Engineering, Control Engineering, Cybernetics or other disciplines with preferably an introductory course in Control Systems and adequate mathematical background (which should include calculus, differential equations, calculus in several variables, complex analysis, linear algebra, Fourier series and Laplace transforms).

English

For candidates whose native language is not English, proof of competency is required. The two approved tests are:

IELTS (British Council International English Language Test) - score of 6.5

TOEFL (Test of English as a Foreign Language) - score of 590 (computer based version 243)

Admissions Tutor: Dr Victor M. Becerra

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 Programme Directors, the Careers Advisory Service, the University's Special Needs Advisor, Study Advisors, Hall Wardens and the Students' Union.

The Programme Director will offer advice on the choice of modules within the programme. A course handbook is provided which gives more details about the modules that make up the MSc 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.

Each student will have a supervisor with expertise in the subject area of the student's dissertation project. It is the responsibility of the supervisor to give guidance to the student through regular meetings. For full-time students these meetings should take place at no more than three-weekly intervals, longer for part-time students. It is the responsibility of the student to raise with the

supervisor any difficulties or problems which occur in the course of the work and to submit coursework and progress reports as required by the course handbook.

Career prospects
Career prospects for Cybernetists 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 of Systems Engineering or at other Universities.

Opportunities for study abroad
N/A

Educational aims of the programme
The programme aims at providing a thorough postgraduate Master's education in Cybernetics.
The MSc in Cybernetics aims to provide its participants with:

1. An integrated, interdisciplinary view of Cybernetics, combining both the technological and biological aspects of Cybernetics, thus reflecting Wiener's definition: "control and communication in animal and machine".
2. An appreciation of technological and biological systems.
3. Knowledge of relevant modern technologies and theories and the ability to apply this knowledge to variety of real world situations.
4. A strong systems grounding to allow them to work in an academic, research or industrial environment.
5. An appreciation of the environment within which Cybernetics occurs.
6. A detailed appreciation of Cybernetics as applied to a specific discipline or environment.
7. Direct experience and practice of the process of Cybernetics through a relevant research project.

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. Advanced mathematical techniques to help model and analyse systems, and use mathematics as a tool for communicating results and concepts. 2. Science underlying cybernetic systems. 3. Information technology as applied in Cybernetics. 4. Systematic design of systems, including a critical awareness of relevant design methods, and the use of appropriate technology. 5. Current problems and new insights in the field of Cybernetics.	The knowledge required for the different topics is obtained via lectures, tutorials, laboratory practicals, assignments and project work. Appropriate IT packages are used and introduced when necessary. Postgraduate demonstrators in laboratory and project supervisors advise students, and feedback is provided on all continually assessed work. By pursuing the course, students are expected to acquire greater initiative and undertake independent research. *Assessment* Most knowledge is tested through a combination of practicals, assignments and formal examinations (mainly open book): students write reports on most assignments and oral presentations are also assessed.

Skills and other attributes

B. Intellectual skills – able to:

1. Select and critically apply scientific principles, mathematical and computer based methods for analysing cybernetic systems.
2. Analyse and solve cybernetic problems showing self-direction and originality.
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 cybernetics to another.
7. Plan and conduct a research project and write a dissertation.
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 MSc project, and written and oral presentations are required for various assignments and for the MSc project.

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. Research into cybernetic problems.
5. Manage projects.
6. 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 as part of their MSc project.

Laboratory practicals and the MSc project are used to teach about 3, and the MSc project is used for 4, 5, and 6.

Assessment

1 and 4 are tested in coursework and in examinations. 2 is tested by assignments, the MSc project and occasionally by examination, 6 is assessed in assignments and the MSc project. 3 is assessed in practicals and sometimes in the MSc project, 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 the MSc project, time management and presentations. Team working skills are acquired through laboratory work. 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 through the MSc project, 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.