MEng Integrated Engineering

UCAS code: H103

For students entering Part 1 in October 2004

Awarding Institution: The University of Reading
Teaching Institution: The University of Reading
Relevant QAA subject benchmarking group(s): Engineering
Faculty of Science Programme length: 4 years
Date of specification: March 2005
Programme Director: Prof. A. G. Atkins
Programme Advisers: Prof. A. G. Atkins and Dr. J. C. A. Ellick
Board of Studies: Mechanical Engineering
Accreditation: Institution of Mechanical Engineers (under review for 2004 entry)

Summary of programme aims and learning outcomes

The MEng programme aims to provide students with up-to-date professional and academic training across a wide range of topics including particularly integrated elements of mechanical and electronic engineering. Topics related to Management and Business are introduced at Part 1 but the main themes of the programme are an integrated approach to design, and engineering research and development. Compared with the BEng programme it provides an extended education in the wider aspects of engineering, including Project Management and Quality issues, as well as extended depth of knowledge in advanced technical subjects. Advanced options draw on the school's research interests in Materials Mechanics, Renewable Energy, and Construction Management, but also Modules from the Departments of Cybernetics and Electronics.
The MEng qualification should also satisfy all the academic requirements to proceed to full chartered engineer status (currently under review).
(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. By the end of this programme students are expected to be competent at: using evidence-based methods in analysis; using creativity and innovation as part of engineering design and problem solving; using information technology; written and oral communication; working in a team; time and resource management; critical self-evaluation. These competencies, as well as business awareness and career management, are embedded within modules in the programme.

Programme content

The following profile 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.

Part 1 (three terms)		*Credits*	*Level*
Compulsory modules			
CE1EA2	*Structures and Materials 1*	20	C
CE1EB2	*Energy 1*	20	C
CE1EC2	*Introduction to 3D modelling*	10	C
CE1ED2	*Software for Engineers*	10	C
EE1A2	*Electronic Devices and Telecoms*	20	C
EG1C2	*Engineering Mathematics*	20	C
SE1B2	*Systems and Circuits*	20	C

Part 2 (three terms)		*Credits*	*Level*
Compulsory modules			
CE1CIC	*Information and Communication*	10	C
CE1CM1	*Management 1*	10	C
CE2EC2	*Analytical Methods and their application*	20	I
CE2ED2	*Design and Manufacture*	20	I
CE2EE2	*Power Systems and Drives*	10	I
CY2A2	*Control and Measurement*	20	I
EC103	*Economics for Construction & Engineering*	10	C
LW1A05	*General Introduction to Law*	10	C
SE2D2	*Computer Systems*	10	I

Part 3 (three terms)		*Credits*	*Level*
Compulsory modules			
CE2CM2	*Management 2*	10	C
CE3EC2	*Quality and Manufacturing*	10	H
CE3EE2	*Sensors and NDT*	10	H
CE3EP3	*MEng Group Project*	30	M
CY3C2	*State Space*	10	H
CY3L2	*Mechatronics*	10	H
CY4J2	*Robotics*	10	H
EE3D2	*Power Electronics*	10	H
Choose module(s) to the value of 20 credits from:			
CE3EG2	*Energy and the Environment*	20	H
XXXXX	*Foreign Language*	20	C or I
XXXXX	*Open Option*	20	H or M
	***NB** The "Open Option" can be chosen from inside the school (in which case it must be a Part 3 module) or from elsewhere but choice may be restricted by timetabling or availability*		

Part 4 (three terms)		*Credits*	*Level*
Compulsory modules			
CE4EA2	*Reliability*	10	M
CE4EK2	*Project Report Writing and Assessment*	10	M
CE4EP3	*Industrial Project*	60	M
Optional modules (choose four from the following modules). This list of special options may vary from year to year.			
CE4EB2	*Creative Problem Solving*	10	M
CE4EF2	*Integrated CAD*	10	M
CE4EE2	*Numerical Tools*	10	M
CE4EJ3	*Biomimetics*	10	M
CE4EH2	*Advanced Renewable Energy*	10	M
CE4EM1	*Project Management for Engineering*	10	M
XXXXX	*Various advanced options from Electronic Engineering*	10	H or M
XXXXX	*Various advanced options from Cybernetics*	10	H or M

Progression requirements
To proceed to Part 2 it is necessary to obtain at least:

- An overall average of 60% in 120 credits
- 30% in each module taken in Part 1

To proceed to Part 3 it is necessary to obtain at least:

- An overall average of 60% in 120 credits
- 30% in each module taken in Part 2

MEng students who do not achieve the overall average of 60% may transfer to the BEng programme in Integrated Engineering, provided they have satisfied the progression rules for BEng.

To qualify for the award of the degree, it is necessary to pass overall. To pass with honours it is necessary to obtain at least 40% in module CE4EP2 and achieve a minimum satisfactory standard (30%) in every module.

The final degree assessment is based on Parts 4, 3 and 2 with weightings of 2 to 2 to 1 respectively.

Summary of teaching and assessment
Teaching is organised in modules that typically involve both lectures and practical work. Most modules are assessed by a mixture of coursework and formal examination. Some modules are assessed only as coursework

Admission requirements
Entrants to this programme are normally required to have obtained:
A Level: 300 points with grade B in A Level Mathematics and Physics or Design and Technology; or
International Baccalaureat: 30 points including 5 in Higher Mathematics; or
Advanced GNVQ: Merit in one of the following subject areas: Engineering, Information Technology or Science, accompanied by A Level Mathematics Grade C; or
Scottish Advanced Highers: Grade B in Mathematics and Bs in two other subjects; or
Irish Leaving Certificate: Grade B in Mathematics and Bs in four other subjects; or
BTEC: with mostly distinctions in individual subjects but including at least a distinction in Mathematics for Higher Education.
Two AS grades are accepted in place of one A-Level (except for Mathematics), provided the subjects have not been taken at A-Level.

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 Learning Resource Centre with some 200 workstations. 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 support is given through practical classes and tutorial classes linked to lecture programmes. There is a Course Adviser to offer advice on the choice of modules within the programme. The School also provides computing facilities dedicated to support of Engineering students.

Career prospects
It is to be expected that the majority of students who follow this programme will go into careers in the engineering industry, through companies typically manufacturing motor vehicles, aircraft and computer products. Others will join research groups in university and industry and the public service. Others may opt for careers in the business world, in finance or in commerce. Graduates of this programme may expect to rise quickly to positions of responsibility.

Opportunities for study abroad
The Department of Engineering participates in the Socrates exchange scheme under which students may spend time at a selected University in Europe, particularly in relation to module CE4EP3. Assessments of work undertaken during these periods will always remain in the hands of staff at Reading. There are formal links with the Universities of Poitiers in France, Twente in the Netherlands and the University of Trento in Italy.

Educational aims of the programme
The MEng programme aims to provide students with up to date professional and academic training in integrated engineering that is relevant to the needs of the engineering profession and industry. The programme places a strong emphasis on integrated engineering design, but is also structured to prepare graduates to rise to senior positions in the engineering industry.

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 methods 2. Science appropriate to integrated engineering 3. Principles of IT and Communications (ITC) relevant to integrated engineering 4. General principles of design 5. Management and business practices (including finance, law, marketing, personnel and quality) 6. Professional and ethical responsibilities including the global and social context of engineering 7. Manufacturing and/or operational practice 8. Codes of practice and the regulatory framework 9. Requirements for safe operation		The knowledge required for the basic topics is delineated in formal lectures supported by laboratory exercises, tutorials and problems. Students are given opportunities to use their engineering knowledge in design and problem solving situations. *Assessment* Most knowledge is tested through a combination of coursework and unseen formal examinations. Design and project work plays an important role in assessing the extent to which students have learned to make use of the knowledge they have acquired.

Skills and other attributes

B. Intellectual skills:

1. Ability to select and apply appropriate mathematical methods for modelling and analysing engineering problems
2. Use of scientific principles in the development of engineering solutions to practical problems
3. Use of scientific principles in the modelling and analysis of engineering systems, processes and products
4. Ability to select and apply appropriate computer based methods for modelling and analysing engineering problems
5. Analysis of systems, processes and components requiring engineering solutions
6. Creation of new processes or products through synthesis of ideas from a wide range of sources
7. Commercial risk evaluation
8. Ability to produce solutions to problems through the application of engineering knowledge and understanding
9. Ability to undertake technical risk evaluation

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Teaching/learning methods and strategies

Design and project work are an important part of the processes whereby students develop their intellectual skills. Exercises are designed to develop different aspects of these skills.

Assessment

Whilst the more theoretical intellectual skills are assessed through formal examination, the more applied aspects are tested in design and project work.

C. Practical skills:

1. Skill in the use of appropriate mathematical methods for modelling and analysing integrated engineering problems
2. Use of relevant test and measurement equipment
3. Experimental laboratory work
4. Use of engineering IT tools
5. Design of a component
6. Practical testing of design ideas in laboratory or through simulation, with technical analysis and critical evaluation of results
7. Research for information to develop ideas further
8. Ability to apply engineering techniques taking account of industrial and commercial constraints
9. Project management

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Teaching/learning methods and strategies

Students obtain practical skills relating to manufacturing and assembly in special sessions with a coordinating theme, while scientifically based skills will be developed in the laboratory, and in evaluating results of experiments. There are many activities which require students to design at different levels.

Design work and a design perspective are apparent throughout the programme.

Assessment

These skills are assessed through coursework, although some "workshop" skills are only formally assessed in qualitative terms.

D. Transferable skills:

1. Manipulation and sorting of data
2. Presentation of data in a variety of ways
3. Use of scientific evidence based methods in the solution of problems
4. Use of general IT tools
5. Use of creativity and innovation in problem solving
6. Working with limited or contradictory information
7. Effective communication
8. Life long learning
9. The engineering approach to the solution of problems
10. Time and resource management
11. Teamwork and leadership
12. Career Management

Teaching/learning methods and strategies

The various different project and laboratory exercises which are distributed though the curriculum are structured to instil the transferable skills identified. A specific module has been defined for Career Management, but its delivery is embedded in other parts of the programme, and it is not listed in the Programme Content above.

Assessment

Because of the integration of this aspect of learning within other elements, much of the assessment is indirect, and achievement of these outcomes implicit in the achievement of other objectives. Thus, for example, submission of a project work by a required deadline after many months of work requires effective planning; or satisfactory completion of a group task in which a student has participated depends upon effective teamwork, and so on.

Please note: This specification provides a concise summary of the main features of the programme and the learning outcomes that a student will achieve and demonstrate upon participation in 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 descriptions in the programme handbooks.