MSC RENEWABLE ENERGY: Technology & Sustainability
For Students Entering in 2006

Awarding Institution:	The University of Reading
Teaching Institution:	The University of Reading
Faculty of Science	Programme length: 12 Months
Date of specification:	16/09/05
Programme Director:	Dr Tim Cockerill and Dr David Fulford
Board of Studies:	Construction Management M.Sc.
Accreditation:	Under negociation.

Summary of programme aims

To impart:

- Understanding of, and the ability to engage in informed debate concerning, the role of energy in the modern world, the resulting environmental and societal impacts (including the evidence for and against climate change) and alternative means of energy provision that seek to minimise any negative impacts,
- Analytic, and limited practical skills, for the assessment, selection and deployment of renewable energy technologies in the field, with an emphasis on Wind, Hydro, Solar and Biomass,
- Analytic skills appropriate for the outline assessment of conventional energy technologies, including those based on fossil and nuclear resources,
- Sufficient experience of conducting and reporting independent research as is necessary for more able candidates to proceed to doctoral studies.
- Confidence in interacting with the key players in the new, and traditional, energy supply technologies within the UK, Europe and elsewhere.

Transferable skills
Many transferable skills are covered, distributed over the portfolio of modules. These include: Report writing, Design of experiments (in the widest sense), Modelling using spreadsheet and other computer tools, Use of the traditional and new media for research, team working skills.

Programme content

Code	*Compulsory Core*	*Credits*	*Level*
CEMREC	Energy Carbon and the Environment	20	M
CEMRHP	Sustainable Heat and Power	20	M
CEMREB	Energy in Buildings	10	M
CEMRUS	Sustainable Urban Systems	10	M
CEMRC	Carbon Management	10	M
CE4EM1	Principles of Project Management	10	M
CEMRMR	Mini-Project & Research Methods	10	M

Research Project

CEMRP	Research Project Dissertation	60	M

Possible Options

APME52	Agricultural Policy for Developing Countries	10	M
CE4EA2	Reliability	10	M
CE4EG2	Computational Fluid Dynamics	10	M
CE4EJ3	Biomimetics	10	M
CE4EF2	Integrated CAD	10	M
CEM025	Sustainable Construction	10	M
CEMC02	Construction Cost Engineering	20	M
CEMC08	Construction Economics	10	M
CEMIB5	Financial Analysis & Investment Appraisal	20	M
CEMIB6	Facilities Management	10	M

CEMIB9	Sustainable Design, Construction & Operation	10	M
CEM022	Accounting & Project Finance	10	M
CEM028	Construction Economics	10	M
IDM018	Microenterprise Finance	10	M
IDM027	Trends and Issues in Nat Resrce Policy & Livelihds	10	M
MTMG02	Boundary Layer Met and Micrometeorology	10	M
MTMG16	Climate Change	10	M
MTMG36	Hydrometeorology	10	M
PSMBC5	Ecological Aspects of Environmental Assessment	10	M

30 Credits of options are required. Some of these options may not be available in practice, due to timetable clashes, or the number of students interested in taking an option may be below a minimum.

Progression requirements

Candidates will not be permitted to attempt more than 70 credits in any single term. Module selections will be reviewed at the beginning of the course to ensure all students have chosen an achievable programme. Progress will be reviewed before the start of the Spring term, to ensure that candidates have a reasonable prospect of amassing sufficient taught credits to pass. Candidates with a deficit of more than 70 taught credits at the start of the Spring term will not be permitted to proceed. Candidates must complete at least 120 taught credits of the course in order to proceed to the research project.

Summary of teaching and assessment

Modules will be delivered mainly in a block format, relying primarily on lectures, seminars, and assessment comprising course work and class test/examinations. Block modules will be supported by prior reading to be completed by students prior to attendance, and will be structured to include sufficient active learning to make the relatively concentrated delivery easily digestible. One 20 credit module will include a limited amount of practical work. Several modules will make extensive use of computer simulation techniques.

The standard University masters classification system will be employed 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

For Masters Degrees (180 Credits Required)

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 *and have no mark below 40 in the compulsory taught modules (CEMRHP, CEMREC, CEMREB, CEMRUS, CEMRC, CEMRMR, CE4EM1)*. 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 not exceed 55 credits.
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.

For PG Diplomas (120 Credits Required))

To pass the Postgraduate Diploma students must gain an average mark of 50 or more *and have no mark below 40 in the compulsory taught modules (CEMRHP, CEMREC, CEMREB, CEMRUS, CEMRC, CEMRMR, CE4EM1)*. 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 not exceed 55 credits.

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

For PG Certificate (60 Credits Required)
To pass the Postgraduate Certificate students must gain an average mark of 50 or more *and have no mark below 40 in the compulsory taught modules (CEMRHP, CEMREC, CEMREB, CEMRUS, CEMRC, CEMRMR, CE4EM1*). In addition the total credit value of all modules marked below 40 must not exceed 10 credits

Admission requirements
Entrants will normally be required to have achieved a degree in a numerate, technical subject at the equivalent of a UK 2.2 honours or better. Any ***substantial*** prior experience in the field will be taken into account to ameliorate any deficiencies in the academic qualifications of an exceptionally able applicant.

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 Disability Advisors, Study Advisors, Hall Wardens and the Students' Union.
Additional school level support will be provided through:
A personal tutor;
The programme director;
A detailed programme handbook;
Activities designed to break down barriers and encourage appropriate social interactions between students, and for that matter, staff

Career prospects
There are excellent employment prospects. Energy is high on the political and research agenda, and the programme is designed to produce graduates able to participate in the entire range of activities that support that agenda, be they located in the industrial, consultancy, public or private sectors.

Opportunities for study abroad or for placements
There is no formal provision for study abroad within the programme. However candidates are strongly encouraged to undertake research projects within external collaborators, who may be located outside the UK.

Educational aims of the programme
The key educational aims are:

- To develop students mathematical and analytic skills in such a way as they are able to make rational decisions about energy supply options based on quantitative arguments
- To introduce students to the wider context in which 'real world' decisions must be made, by demonstrating, through example, that technical analysis alone cannot be relied on to produce positive outcomes
- To develop students' mental agility and flexibility with multi-disciplinary problems, such that they are able to recognise the key drivers influencing any energy related decision, and bring to bear appropriate analytic skills such that optimal outcomes are achieved, drawing on personal development and research where necessary.

Programme Outcomes

Knowledge and Understanding

A. Knowledge and understanding of: 1. The role of energy in the modern world, including the resulting environmental and societal impacts 2. Technical and other means of minimising the negative environmental and societal impacts of energy use 3. 'Practical' skills in the deployment of low impact energy systems 4. Deeper understanding of aspects of the above	**Teaching/learning methods and strategies** 1. Modules CEMREC, CEMRUS, CEMRC 2. Modules CEMRHP, CEMREB,CEMRUS,,CEMRC 3. Modules CEMRHP,CEMREB,CE4EM1 4. Optional modules **Assessment** Distributed across all cited modules: • Individual Assignments • Group assignments • Examinations

Skills and other attributes

B. Intellectual skills – able to: 1. Identify the key theoretical issues underlying real, multidisciplinary problems (particularly in energy) 2. Present an argument using data derived from research or literature 3. Present an argument using quantitative reasoning, supported by other analytic reasoning where appropriate	**Teaching/learning methods and strategies** 1. Case studies in lecture courses, and assessments based on real problems 2. Module CEMRMR, and Research Project 3. Quantitative reasoning in context is intrinsic to all core modules **Assessment** 1. Assignments & Examinations in modules CEMREC, CEMRHP, CEMREB, CEMRUS, CEMPM, CEMRMR 2. Assignments in modules CEMREC, CEMRCM,CEMRMR Write ups and seminars for min-project and research project
C. Practical skills – able to: 1. Design and perform laboratory experiments 2. Use computers for research, analysis and presentation 3. Manage projects in the field	**Teaching/learning methods and strategies** 1. Laboratory experiments in CEMRHP 2. Integral to all core modules, training provided as part of CEMRMR 3. Module CE4EM1 and field trips in other modules **Assessment** 1. Laboratory write-ups 2. Essential for completion of many assignments 3. Assignment & Exam in CE4EM1, also completion of field work

D. Transferable skills – able to:

1. Write formal reports
2. Give seminars
3. Design and use spreadsheets for modelling
4. Use commercial software
5. Obtain information from conventional and new media
6. Undertake research
7. Work in groups

Teaching/learning methods and strategies

1. Module CEMRMR
2. Module CEMRMR
3. Instruction distributed across all core modules
4. Commercial software used in CEMRHP,CEMREC
5. Module CEMRMR, and other core modules
6. Module CEMRMR, and in preparation of assignments for other modules
7. Group work intrinsic to CEMREC and CEMRHP, particularly practicals

Assessment

1. Final assignment for CEMRMR, and other coursework reports. Research project
2. Seminar in module CEMRMR, and in other modules
3. Spreadsheets developed during CEMRHP and CEMRC
4. Assignments in some core modules are based around commercial software
5. Integral part of almost all coursework
6. CEMRMR and Research Project outputs
7. Practical write-ups in CEMRHP

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.