

**MSc Renewable Energy: Technology and Sustainability (full-time)**  
**For students entering in 2014/5**

Awarding Institution:	University of Reading
Teaching Institution:	University of Reading
Relevant QAA subject Benchmarking group(s):	
Faculty:	Science Faculty
Programme length:	1 years
Date of specification:	25/Nov/2014
Programme Director:	Dr Maria Vahdati
Programme Advisor:	
Board of Studies:	MSc in Construction Management
Accreditation:	Chartered Institute of Building Services Engineers Energy Institute

**Summary of programme aims**

The aims are to combine specialist expertise on construction technology and management with a strong focus on construction for a low energy, low carbon, built environment. The programme will introduce issues and debates concerning the role of energy in the modern world, the resulting environmental and societal impact and alternative means of energy provision that seek to minimise any negative impacts. We also cover issues surrounding the development of power systems and the introduction of renewable technologies into the built environment. We develop analytical and practical skills for the assessment, selection and deployment of renewable energy technologies in the field, with an emphasis on wind, hydro, solar, wave/tidal and biomass.

**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 the use of information technology.

The programme will also develop the following transferable skills:

- 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.
- Analytical and practical skills for the assessment, selection and deployment of renewable energy technologies in the field with an emphasis on wind, hydro, solar, wave/tidal and biomass.
- Ability to make rational decisions about energy supply options based on quantitative arguments.
- Understanding of the issues which need to be considered when incorporating renewable energy in power systems.
- Analytic skills appropriate for the outline assessment of conventional energy technologies.
- Mental agility and flexibility with multi-disciplinary problems.
- Confidence in interacting with the key players in the new and traditional energy supply technologies within the UK, Europe and elsewhere.

**Programme content**

The programme offers nine core modules and one optional module to be taken from the list below. Flexibility in the choice of the optional module enables candidates to tailor the programme to their own learning requirements.

Core:

CEM109	Research Project and Dissertation	60	7
CEM106	Sustainable heat and power	40	7
CEM221	Energy in Buildings	10	7
CEM224	Carbon Management	10	7
CEM227	Renewable energy in power systems	10	7
CEM231	Energy Carbon and the Environment	10	7
CEM232	Sustainable Urban Systems	10	7
CEM234	Carbon Management and Analysis	10	7
CEM235	Engineering Project Management	10	7

Optional:

CEM213	Urban sustainable development in EE	10	7
CEM220	Urban Sustainability	10	7
CEM222	Building Simulation	10	7
CEM223	Urban Microclimates	10	7
CEM225	Building Information Modelling	10	7
CEM226	ICT and Energy Management	10	7
CEM229	Green Building Assessment	10	7
CEM236	Environmental Quality and Well-being	10	7
CEM301	Thermodynamics of Energy Systems	10	7
CEM303	Sustainable Design, Construction and Operation	10	7
CEM337	Sustainable Design and Environmental Engineering	10	7

### **Part-time or modular arrangements**

This programme may be taken on a part-time basis, normally over 24 months, up to a maximum of 63 months, with a choice of September or January start.

All 10-credit modules will be provided in one week attendance periods at the University.

Any 10-credit module provided by the School can be taken as a short course on an ad-hoc basis.

### **Progression requirements**

There are no intermediate progression requirements.

### **Summary of Teaching and Assessment**

The general assessment pattern for each module is by coursework and examinations. Detailed assessment regimes are specified in the relevant module descriptions.

The overall mark for the programme will be the aggregate mark of modules, weighted by credit value and classified as below. For further details see 'How to calculate an award' at:

<http://www.reading.ac.uk/exams/>

The programme will use the University's classification scheme:

*Passing categories:*

70 - 100% Work of distinction standard

60 - 69% Work of merit standard

50 - 59% Work of good standard

*Failing categories:*

40 - 49% Work below threshold standard (BTS)

0 - 40% Unsatisfactory Work

Further information on the classification conventions, including borderline criteria, are available at

<http://www.reading.ac.uk/internal/exams/Policies/exa-class.aspx>

### **Masters award**

To obtain the Masters award a student must take 180 credits consisting of the nine compulsory core modules and one optional module. To pass the MSc students must gain an average mark of 50 or more over 180 credits 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 the total credit value of all modules marked below 50 must not exceed 50 credits.

Students who gain an average mark of 70 or more overall or an average mark of 68 or more and a mark of 70 or more in 90 credits, including a mark of 60 or more for the dissertation, and have no marks below 40 will be eligible for a Distinction. Those gaining an average mark of 60 or more overall or an average mark of 58 or more and a mark of 60 or more in 90 credits, including a mark of 50 or more for the dissertation, and have no mark below 40 will be awarded a Merit.

### **Diploma award**

To obtain the Postgraduate Diploma a student must take 120 credits including at least three compulsory core modules (not including CEM109 Research Project and Dissertation' or CEM106 Sustainable Heat and Power'). To pass the Diploma students must gain an average mark of 50 or more over the 120 credits. In addition the total credit value of all modules marked below 40 must not exceed 30 credits and the total credit value of all modules marked below 50 must not exceed 50 credits.

Students who gain an average mark of 70 or more over 120 credits or an average mark of 68 or more over 120 credits and a mark of 70 or more in 60 credits, and have no mark below 40 will be awarded a Distinction. Those gaining an average mark of 60 or more over 120 credits, or an average mark of 58 or more and a mark of 60 or more in 60 credits, and have no mark below 40 will be awarded a Merit.

### **Certificate award**

To obtain the Postgraduate Certificate a student must take 60 credits consisting of at least three compulsory core modules (not including CEM109 Research Project and Dissertation' or CEM106 Sustainable Heat and Power'). To pass the Certificate students must gain an average mark of 50 or more over the 60 credits. In addition the total credit value of all modules marked below 40 must not exceed 10 credits.

**Note:** A module cannot be credited for more than one award.

### **Admission requirements**

Applicants are normally required to have a good undergraduate honours degree, preferably with some relevant industrial experience. Candidates with a lesser degree and relevant professional experience will also be considered.

**Admissions Tutor:** Dr Maria Vahdati

### **Support for students and their learning**

University support for students and their learning falls into two categories. Learning support is provided by a wide array of services across the University, including: the University Library, the Careers, Placement and Experience Centre (CPEC), In-session English Support Programme, the Study Advice and Mathematics Support Centre teams, IT Services and 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, School Senior Tutors, the Students' Union, the Medical Practice and advisers in the Student Services Centre. The Student Services Centre is housed in the Carrington Building and offers advice on accommodation, careers, disability, finance, and wellbeing, academic issues (eg problems with module selection) and exam related queries. Students can get key information and guidance from the team of Helpdesk Advisers, or make an appointment with a specialist adviser; Student Services also offer drop-in sessions and runs workshops and seminars on a range of topics. For more information see [www.reading.ac.uk/student](http://www.reading.ac.uk/student)

All students in the School are provided with guidance and support for their learning in a variety of ways. Interaction takes place with the Programme Director, Lecturing Staff and Dissertation Supervisors who provide guidance throughout the period of study. Dissertation Supervisors will guide students through the dissertation by organising regular structured meetings. A minimum of 12 supervision meetings would be expected during the programme at times that are mutually convenient. Furthermore all students will be able to meet the Programme Director and lecturing staff at mutually convenient times throughout the year. The School's administrative, support and technical staff help to support and personalise students' experience with the School. In addition to the above, students will have access to the SCME Resource Room and receive a detailed programme handbook and other relevant information packages. The Programme Director will also organise an annual induction event where all students will be welcomed by their lecturing staff in a friendly and informal setting.

All modules are supported by learning materials on a dedicated website. Students are given access to the material via the Blackboard platform, which can be accessed on or off campus.

### **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. Graduates from this programme will typically be employed by the energy industry, consultancies, local government and various private sector companies.

### **Opportunities for study abroad or for placements**

There are no formal arrangements for study abroad or placements.

### **Programme Outcomes**

## Knowledge and Understanding

### A. Knowledge and understanding of:

1. 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,
2. The assessment, selection and deployment of renewable energy technologies in the field, with an emphasis on wind, hydro, solar, wave/tidal and biomass,
3. The issues which need to be considered when incorporating renewable energy in power systems.
4. The analytic skills appropriate for the outline assessment of conventional energy technologies, including those based on fossil and nuclear resources,
5. Conducting and reporting independent research as is necessary for more able candidates to proceed to doctoral studies,
6. Energy efficient technologies with a particular emphasis on their use within the built environment.

### Teaching/learning methods and strategies

The core one-week modules provide the concepts in a variety of disciplines that form the multi-disciplinary study. Optional modules allow students to tailor their learning experience to their needs. Application of the principles is undertaken in the integrating studies module. Teaching methods include formal lectures, guest lecturers from invited industry speakers, tutorial discussions, individual and group presentations, group exercises, case studies, guided reading and guidance on key sources of reference material. Feedback and guidance are important elements in formative assessment and complement an emphasis on self-study. Learning is supported by Blackboard VLE.

#### *Assessment*

Details of assessment are provided in the module descriptions. Modules are individually assessed through examinations, assignments, laboratory work, use of modelling tools and coursework, with some group work. The assessment in the integrating module is designed to focus on the application of knowledge from individual modules. Independent research skills and the ability to produce a major report are assessed in the dissertation.

#### **Summary**

Teaching and learning is offered through case-supported lectures and tutorials, web-based material, guest speakers from international firms, visits to national and international institutions, and guided reading.

## 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

Case studies in lecture courses, and assessments based on real problems. Quantitative reasoning in context is intrinsic to all modules. Students are challenged in class to make clear arguments, form views and defend them. Written assignments, discussions and group work provide vehicles for developing intellectual skills. Dissertation research under supervision provides opportunities for critical thinking and developing the ability to construct arguments from different disciplinary perspectives.

#### *Assessment*

Coursework, examinations and dissertation.

#### **Summary**

Intellectual skills are gained through all modes of

teaching/learning as part of every individual module and are assessed through individual and teamwork assignments, reports, presentations, class tests, examinations and a dissertation.

### **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. Design and perform laboratory experiments.
2. Use of energy related software for design and analysis.
3. Use computers for research, analysis and presentation.
4. Manage projects in the field.

#### *Assessment*

- Laboratory reports.
- Examinations.
- Assignments.
- Research project dissertation

#### **Summary**

All practical skills will be developed through laboratory work and finally demonstrated and improved through a dissertation. In addition to that students will learn practical skills through directed reading, lectures and field trips.

### **D. Transferable skills - able to:**

Students are expected to acquire an ability to think analytically, to develop frameworks for considering and resolving complex problems, and to discriminate between good and bad arguments.

They will be able to research a variety of sources in libraries and on the internet, and, in particular, to research and assess academic literature.

Particular elements of the programme expose students to the use of information technology and encourage the development of general professional capabilities including recognition of deadlines, time management team work and communication skills.

Students will gain experience in writing formal reports, giving seminars, designing and using spreadsheets for modelling.

### **Teaching/learning methods and strategies**

Students are required to undertake and understand a wide range of reading; specified references and their own sources. Discussions in lectures, seminars, laboratory classes and tutorials emphasise the use of critical thinking and an analytical approach.

#### *Assessment*

Assignments, group and individual presentations, laboratory work, assessment of the use of commercial software, poster preparation and dissertation

#### **Summary**

Transferable skills are attained through all modules in the way of exercises, problem-solving assignments, presentations, lectures, and through the Blackboard VLE.

**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 process or external sources, such as professional bodies, requires a change to be made. In such circumstances, a revised specification will be issued.**