

**Doctor of Engineering (full-time)
For students entering Part 1 in 2014/5**

UCAS code:

Awarding Institution:	University of Reading
Teaching Institution:	University of Reading
Relevant QAA subject Benchmarking group(s):	
Faculty:	Science Faculty
Programme length:	4 years
Date of specification:	27/Jan/2015
Programme Director:	Prof Li Shao
Programme Advisor:	Mrs Jenny Berger
Board of Studies:	SCME Board of Studies for Postgraduate
Programmes and the Annual Review Panel:	
Accreditation:	EngD

Summary of programme aims

This Engineering Doctorate (EngD) programme is structured to deliver advanced knowledge and understanding of the theme *Technologies for Sustainable Built Environments* to Research Engineers (REs), including issues relevant to their roles as professional engineers. In particular this high-level programme examines cutting-edge development of current knowledge in sustainable and low carbon technologies used in the construction and maintenance of buildings, infrastructure and energy management. It will also equip students on the programme with the necessary skills to evaluate research findings and to conduct original research appropriate to their professional work. Many engineering issues related to sustainable technologies also deal with social, environmental, economic and communication skills areas which are covered by taught modules. A key aspect is that the programme is sufficiently flexible to cater for the varying needs of the research engineers who will be based in industry, but registered for the degree in the University.

The aims of the programme are to increase knowledge and understanding and to develop appropriate intellectual, practical and transferable skills. In particular, this high-level programme aims to examine developments at the cutting-edge of current knowledge in applying sustainable technologies in the built environment. It also aims to equip REs on the programme with the necessary skills to critically evaluate research findings and to conduct original research appropriate to their professional work.

Typically, holders of the qualification will have the qualities and transferable skills necessary for employment requiring the exercise of personal responsibility and largely autonomous initiative in complex and unpredictable situations, in professional engineering or equivalent environments, and will be able to:

- Make informed judgements on complex issues in specialist fields, often in the absence of complete data, and be able to communicate their ideas and conclusions clearly and effectively to specialist and non-specialist audiences;
- Continue to undertake pure and / or applied research and development at an advanced level, contributing substantially to the development of new technologies, ideas or approaches.

Transferable skills

During the course of their studies at Reading, all students will be expected to enhance their academic and personal transferable skills. In following this programme, students will have had the opportunity to develop such skills, in particular relating to and will have been encouraged to further develop and enhance the full set of skills through a variety of opportunities available outside their curriculum.

The EngD programme will train individuals capable of driving innovative thinking and developing sustainable technologies for the construction and energy management industries. Working closely with industrial partners who will be selected for their pioneering approaches to construction and technological development, University academics will provide a unique educational and research experience equipping future leaders in the construction industry with the management and technological skills required to deliver the zero-carbon buildings of the future.

The REs will be conducting research in one of the areas of the development and application of sustainable construction, renewable energy applications and energy management technologies, including their economic and social impacts. Attention will also extend to the way in which the adoption and use of such technologies can be enhanced through procurement and other policy levers. In particular, research in the Centre will be focussed on the following two complementary themes:

- Sustainable building and services systems; and

- Energy management in buildings and infrastructure systems

In addition to the research programme, candidates will undertake a mixture of compulsory and optional modules, most of which are currently offered in the University for PhD research students and existing MSc courses. The taught programme is planned to fulfil the following objectives:

- To provide up-to-date knowledge of the relationship between engineering research, innovative technologies, and sustainability with emphasis on application to the built environment and energy management;
- To deliver professional development in management and business skills that are necessary for dealing with a constantly changing legislative environment particularly in relation to energy utilisation;
- To fill any knowledge gaps that may arise from the research project.

Programme content

This is separated into two distinct but related parts, one is a taught component the other is a research component.

A. The taught component

The following modules are compulsory:

<i>Code</i>	<i>Module title</i>	<i>Credits</i>	<i>Level</i>
INMR66	Business Domain and Requirements Analysis	20	7
CEMRC1	Carbon Management	10	7
CEMREC1	Energy, Carbon and the Environment	10	7
CEMREB1	Energy in Buildings	10	7
CEMRMR	Research Methods	10	7
CEM222	Building Simulation	10	7
Total Credits		70	

In addition there is a need to obtain at least 50 credits of optional modules from those on offer at the University. The optional modules made available may change from time to time to incorporate new modules and accommodate resource and staff availability issues. The optional modules chosen for each student must demonstrate the application of knowledge to professional engineering applications. The module choice will be agreed between the student and the Supervisory Panel.

The compulsory and optional modules would normally be delivered during the first two years of the programme. The new EngD cohort of REs will be required to attend an unassessed induction module that will be based on the University's Graduate Skills Development Programme to introduce the new REs to aspects of postgraduate research education.

Module delivery arrangements

Block delivery or University term.

Progression requirements

The Taught Component

In order to be awarded an EngD, REs must pass all the Compulsory Modules (70 credits in total) and Optional Modules (not less than 50 credits in total).

The SCME Postgraduate Examination Board assesses all the taught component modules. The current marking criteria and classification framework are available at www.reading.ac.uk

In order to successfully complete the taught element of the programme a student will normally be required to achieve an average of at least 50 across modules totalling 120 credits, which must include the 80 credits specified above as compulsory. 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 55 credits.

The Director of the EngD programme is a member of the Examination Board which includes the Directors of all taught postgraduate programmes and external examiners for those programmes. The module results for all RE's is separately reported to the Examination Board and reported to the Annual Review Panel.

The Annual Review Panel has the option to terminate the RE's enrolment on the programme if progress on the taught component is not meeting a pass standard. The University offers a range of programmes for which those leaving the EngD programme may be eligible. Each case will be reviewed individually.

The Research Component

The research project will form the basis for the RE's EngD thesis to be submitted at the end of year 4. The current code of practice on research students will be applied to REs on this programme.

Throughout the programme, at six monthly intervals, there will be a formal review of the research project by the Supervisory Panel. This panel will assess the project and where there are concerns about the RE's progress a formal action plan will be drawn up and agreed between RE, University and industrial supervisors and the Director of the EngD programme.

At the end of each year there will be an annual review of the RE's progress. This will be conducted by an Annual Review Panel that includes University and industrial supervisors and the Director of the EngD programme. The annual review of RE's progress will include the module results from the SCME Postgraduate Examination Board. The Review Panel has the option to terminate the RE's enrolment on the programme if progress on the research project is not meeting the required standard (see the section *Support for students and their learning*). The University offers a range of programmes for which those leaving the EngD programme may be eligible. Each case will be reviewed individually.

In the final year the Annual Review Panel will receive reports of the examination of the RE's thesis. The report of the Annual Review Panel will be forwarded to the Postgraduate Research Students Committee for review.

Assessment and classification

The compulsory and optional modules will be taught in either a block delivery mode or over one University term. The full detail of teaching and assessment in each module is given in the module descriptions. The general approach to teaching is to deliver lectures, tutorials, project and laboratory work and site visits either during study visits, usually of one-week module duration, or over one University term. These attendance periods are supported with guided study through traditional private study and web based learning.

The modules will be assessed by examination and coursework or by coursework alone. All modules are offered to other programmes within the University and the teaching, which may be cohort specific, will facilitate the interaction between all of the students on the modules. In this way the EngD student experience is enhanced. The assessment criteria for all modules will be as that described in the current module description.

Successful completion of all 70 credits of the compulsory modules and at least 50 credits of optional modules is required for the award of an EngD.

The current marking criteria and classification framework as shown at www.reading.ac.uk/Exams/ will be applied to all modules.

The criteria for the assessment of the EngD thesis will be as shown in the Rules for the Submission of Theses for Higher Degrees at:

www.rdg.ac.uk/Exams/ThesesRules.pdf

and the Guide for Examiners for Higher Degrees by Research as shown at:

www.reading.ac.uk/Exams/phdexaminers.pdf

In addition, an annual EngD conference will be organised during which all REs will present their research output which will be assessed by the University and industrial supervisors and the EngD Programme Director

Admission requirements

Entrants to this programme are normally required to have obtained a 2.1 class honours first degree or better; or an alternative qualification of equivalent academic standing; in a relevant science or engineering subject.

Or

A Masters degree at merit level or better; or an alternative qualification of equivalent academic standing; in a relevant science or engineering subject.

All RE's must be sponsored by a company who have a current contract with the University to be engaged with the EngD programme. All applicants will be interviewed prior to admission to the EngD programme.

For applicants with prior learning and prior experiential learning the University Policy and procedure for the Assessment of Prior (Experiential) Learning (AP(E)L) will be followed.

Admissions Tutor: EngD Programme Director

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-sessional 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

Each RE will have at least two supervisors. There will be one or two University supervisors and at least one industrial supervisor. Every RE will have a Supervisory Panel which will include the University and industrial supervisors. Whilst the University supervisors will be engaged in routine RE monitoring and research project supervision, the Supervisory Panel will formally monitor the RE's progress every six months. In addition, an annual review of the progress of the RE will be undertaken by an Annual Review Panel. This will include University and industrial supervisors and the EngD Programme Director.

All supervisors and each new cohort of REs will be required to attend an induction workshop for the purpose of familiarisation with the EngD programme and to develop competencies in the supervision and management of REs. A Handbook describing the EngD programme and including details of responsibilities for all those involved will be prepared and distributed to all REs and supervisors.

The industrial supervisors will be selected on the basis of their knowledge of the research topic. Any action taken with regards to the replacement of the supervisor will be in accordance with the Collaborative Contract Agreement between the University, Industrial Sponsor and the RE.

Career learning

Career prospects

The EngD Programme will be able to accommodate Research Engineers at all levels from a wide range of collaborating companies whose businesses are in construction, energy generation, and energy management. The programme will offer the RE competence in his/her own specialised research field in addition to more generic leadership and project management skills via a series of compulsory and optional taught modules and project work. The TSBE Centre will offer participants the chance to engage in holistic projects dealing with sustainability and energy efficiency in the built environment. It is anticipated that those trained will add significant value to the companies they will be working in by increasing efficiency from design to build, delivery and operation. This project-based research training will also offer participating REs the chance to interact extensively with others enrolled on the programme, increasing networking opportunities and the ability to learn from each other, thus providing significant added value to the researchers' experiences and future career prospects.

Opportunities for study abroad

It is possible that some REs who will be working with a multi-national company could carry out part of their research abroad. However, all REs will be encouraged to attend and present their research output at international conferences abroad and network with international researchers.

Placement opportunities

Programme Outcomes

In particular, successful students will gain the following knowledge, understanding and skills.

Knowledge and Understanding

A. Knowledge and understanding of:

- Research methods and design study
- Project planning and management
- Advanced engineering and related methods in applied engineering research and professional practice
- Relevant professional issues

Teaching/learning methods and strategies

- Reflection on course materials and related research and readings
- Face-to-face teaching and supervision
- Face-to-face discussion
- Professional experiences

Assessment

- Assessment of assignments, based on the criteria stated in the summary of teaching assessment.

Skills and other attributes

B. Intellectual skills - able to:

- Analyse concepts, arguments, data and situations
- Synthesise descriptions and underlying features of situations from a variety of sources
- Create plans of various kinds, including research investigations
- Evaluate statistical results and research findings
- Relate systematic evidence to issues arising in professional practice

C. Practical skills - able to:

- Use statistical and related methods in professional context
- Formulate and manage research projects
- Access wide range of literature and data using bibliographic and IT skills
- Use IT for data handling and simulation software for analysis
- Communicate to different audiences

D. Transferable skills - able to:

- Monitor own learning
- Communicate orally and in writing
- Search for information in the literature and on the internet
- Use information to make decisions
- Project planning and management
- Data analysis
- Report and thesis writing

Teaching/learning methods and strategies

- Activities based on course materials, related research, readings, participating in seminars and workshops, attending conferences.

Assessment

- Assessment of assignments is based on the criteria stated in the summary of teaching assessment.

Teaching/learning methods and strategies

- Activities based on course materials and related research and readings
- Assignment preparation for taught modules

Assessment

- Assignments and thesis will report the results of such activities

Teaching/learning methods and strategies

- Course materials
- Discussion with supervisors and peers
- Presentations at workshops and conferences

Assessment

- Literature review

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.