

Programme of study for the Integrated degree of PhD and MSc (Low Carbon Technologies)¹

Year One (a total of 135 credits in taught modular courses will be taken as well as the research project)

- The candidate will commence research under the direction of their supervisor(s) from term 3.
- Compulsory training and skills module:
PEME5480 Transferable Skills & Professional Development 1 (15 credits). Candidates undertake a number of non-credit bearing generic skills courses from a range provided by central training providers (SDDU, ISS, Library), the Faculty of Engineering or outside bodies.
- Compulsory specialised subject modules as follows:
PEME5400 Interdisciplinary Research Projects (60 credits) PEME5431 Sustainable Energy Processes (30 credits) PEME5445 Climate Change Control Technology (15 credits) SOEE5561 Climate Change Mitigation (15 credits)

Year Two (a total of 45 credits in taught modular courses will be taken as well as the research project)

- The candidate will continue research under the direction of their supervisor(s).
- Compulsory training and skills module
PEME5485 Transferable Skills & Professional Development 2 (15 credits) (including industrial/research organisation placement) with further non-credit bearing training courses being taken as appropriate.
- Optional specialised subject modules (30 credits) selected from the following list:
PEME5420 Advanced Energy Systems (15 credits)
SOEE5051 Business, Environment & Sustainability (15 credits) CCFD5170
Commercial Software (15 credits)
SOEE5540M Climate Change; Physical Science Basis (15 credits) SOEE5281M
Introduction to Sustainability (15 credits)
PIED5596M World Politics and the Environment (15 credits)

Any other M level module relevant to the research that is approved by the Programme Director and Supervisor.

Candidates will be permitted to transfer to full PhD status provided they satisfy the transfer panel and they also achieve an average of 50% over all 180 credits of which 150 credits must be passed at 50% or more in each and every module undertaken and of these 135 credits must be at M Level

Years Three and Four

- The candidate will continue research under the direction of their supervisor(s)
- Optional and compulsory non-credit bearing training and skills modules selected as appropriate from the wide-range of training courses provided at the University of Leeds (e.g. Writing for Research PGRs in the Sciences, Thesis Presentation).

Changes may be made from time to time to the title of modular courses and the optional modular courses that are available.

**Learning Outcomes / Transferable Key Skills / Learning Context / Assessment – overall programme
PhD and MSc (Low Carbon Technologies)**

1 Learning Outcomes

On completion of the Integrated PhD with MSc as a whole, PGRs should have shown evidence of being able to:

¹ Entry to this programme was suspended from 2014 -2015. See also the general Programme of Study for the Integrated degrees of PhD and Master (MA, LLM or MSc) which specifies the overall arrangements for the University Integrated PhD and Masters programme

INTEGRATED DEGREE OF PHD AND MSC (LOW CARBON TECHNOLOGIES)

- discover, interpret and communicate new knowledge through original research in the field of low carbon technologies and produce scholarship of publishable quality which satisfies peer review;
- independently and proactively formulate ideas and hypotheses and to design, develop, implement and execute plans by which to evaluate these;
- demonstrate systematic and extensive knowledge across the four interdisciplinary themes of Transport and Energy, Carbon Storage, Low Carbon Enabling Technologies and Climate Change & Energy Systems Research;
- critically and creatively evaluate current issues, research and advanced scholarship in the above themes;
- exhibit generic and subject specific skills and techniques necessary for effective working in an interdisciplinary research-intensive environment, in liaison with academic and industrial partners, ensuring widening participation through engagement in public events, enterprise and knowledge transfer;
- demonstrate a portfolio of transferable professional skills through the use of Personal Development Plans including, for example, communication and presentation skills, ethics, networking and team development, commercial awareness; to take a proactive and self-reflective role in working and to develop professional relationships with others where appropriate;
- undertake an individual research project in the area of Low Carbon Technologies, incorporating research in a specific area, but also including reference to the wider context of low carbon technologies policy, legislation and environmental impact; to present and defend research outcomes which extend the forefront of the low carbon technologies discipline and professional practice;
- demonstrate the skills necessary for a career as a researcher and/or for employment in a senior and leading capacity in a relevant area of professional practice or industry;
- evaluate their own achievement and that of others;
- exhibit self-direction and effective decision making in complex and unpredictable situations;
- demonstrate independent learning and the ability to work in a way which ensures continuing professional development;

2 Transferable (Key) Skills

PGRs will have had the opportunity to acquire the following abilities through the research training and research specified for the programme

- the skills necessary for a career as a researcher and/or for employment in a senior and leading capacity in a relevant area of professional practice or industry;
- evaluating their own achievement and that of others;
- self-direction and effective decision making in complex and unpredictable situations;
- independent learning and the ability to work in a way which ensures continuing professional development;

3 Learning Context

The learning context will include the critical analysis of, and decision making in, complex and unpredictable professional and situations. The structure of the programme will provide research and/or professional training, breadth and depth of study and opportunities for drawing upon appropriate resources and techniques.

Opportunities will be provided for PGRs to:

- develop to a high level interests and informed opinions
- develop to a high level their design and management of their learning activities
- develop to a high level their communication of their conclusions;
- make an original contribution to the field

PGRs will be expected to engage in the exercise of autonomous initiative in their study and work in professional environments.

4 Assessment

INTEGRATED DEGREE OF PHD AND MSC (LOW CARBON TECHNOLOGIES)

Achievement will be assessed by the examination of the candidate's thesis and performance under oral examination. Assessment will involve the achievement of the candidate in:

- evidencing an ability to conduct original and independent broad and in-depth enquiry within the discipline or within different aspects of the area of professional practice normally leading to published work;
- drawing on and/or developing a range of research techniques and methodologies appropriate to enquiries into the discipline/area of professional practice;
- demonstrating independent critical ability in the application of breadth and depth of knowledge to complex issues within the discipline or specialist area of professional practice;
- drawing on a range of perspectives on the area of study;
- evaluating and criticising received opinion;
- making reasoned and well-informed judgements on complex issues within the specialism whilst understanding the limitations on judgements made in the absence of complete data
- the written style and overall presentation of the thesis.

Learning Outcomes / Transferable Key Skills / Learning Context / Assessment for MSc (Low Carbon Technologies)

As the degree programme contains a Masters level qualification, candidates are required to achieve the Masters learning outcomes at the appropriate stage within the Integrated PhD and Masters programme.

1. Learning Outcomes

On completion of the MSc programme PGRs should have shown evidence of being able to:

- demonstrate in-depth specialist knowledge and mastery of techniques and information relevant to low carbon technologies in the four interdisciplinary themes of: Transport and Energy, Carbon Storage, Low Carbon Enabling Technologies and Climate Change & Energy Systems Research; demonstrate a sophisticated understanding of concepts, information and techniques at the forefront of these disciplines
- exhibit a wide breadth of knowledge of generic and specific industry related skills such as the use of modelling software, data collection, aspects of legislation
- demonstrate a comprehensive understanding of techniques applicable to their own research or advanced scholarship in the fields of low carbon technologies
- take a proactive and self-reflective role in working and developing professional relationships with others critically and creatively evaluate current issues, research and advanced scholarship in the field of low carbon technologies
- undertake an individual and team research project and be able to plan, research, execute and analyse the results from an appropriate programme of work.

2. Transferable (key) skills

Masters (Taught) PGRs will have had the opportunity to acquire the following abilities as defined in the modules specified for the programme:

- the skills necessary to undertake a higher research degree and/or for employment in a higher capacity in industry or area of professional practice
- evaluating their own achievement and that of others
- self direction and effective decision making in complex and unpredictable situations
- independent learning and the ability to work in a way which ensures continuing professional development

- critically to engage in the development of professional/disciplinary boundaries and norms

3. Learning Context

For Masters (Taught) PGRs the learning context will include the analysis of, and decision making in, complex and unpredictable situations. The structure of the programme will provide breadth and/or depth of study and opportunities for drawing upon appropriate resources and techniques. Opportunities will be provided for PGRs to:

develop interests and informed opinions their involvement in the design and management of their learning activities

- their communication of their conclusions.;

PGRs will be expected to progress to fully autonomous study and work. **4. Assessment**

Achievement for the degree of Master (taught programme) will be assessed by a variety of methods in accordance with the learning outcomes of the modules specified for the year/programme and will involve the achievement of the PGRs in:

- evidencing an ability to conduct independent in-depth enquiry within the discipline;
- demonstrating the ability to apply breadth and/or depth of knowledge to a complex specialist area;
- drawing on a range of perspectives on an area of study;
- evaluating and criticising received opinion;
- make reasoned judgements whilst understanding the limitations on judgements made in the absence of complete data.