

INTEGRATED DEGREE OF PHD AND MSC (NUCLEAR FUEL CYCLE)

Programme of study for the Integrated degree of PhD and MSc (Nuclear Fuel Cycle)¹

Entry to this programme has been suspended for 2014 -2015

Year One (a total of 90 credits in taught modular courses (including 60 credit MSc Research Project) will be taken as well as commencement of the PhD research project)

Compulsory training and skills module:

- Compulsory training and skills module:

CAPE5950M Transferable Skills & Professional Development 1 (15 credits) (Semester 3)

- Compulsory specialised subject modules as follows:

CAPE5000M Research Project (MSc) (60 credits) (Semester 3)

CAPE5331M Nuclear Operations (15 credits) (Semester 3)

Candidates also undertake a number of non-credit bearing generic skills courses from a range provided by central training providers (SDDU, ISS, Library etc), the Faculty or outside bodies.

Year Two (a total of 75 credits in taught modular courses will be taken as well as continuation of the PhD research project)

- The candidate will continue research under the direction of their supervisor(s)

- Compulsory training and skills module:

CAPE5980M Transferable Skills & Professional Development 2 (15 credits).- (Semester 3)

- Further non-credit bearing training courses will be taken as appropriate.

- Compulsory specialised subject modules:

CAPE5380M Nuclear Futures (15 credits)

CAPE5370M Nuclear Engineering and the Nuclear Industry (30 credits)(Semester 3)

Plus 15 credits selected from the following list chosen for relevance to the PhD:

CAPE5312M Batch Process Engineering 15 credits (Semester 2)

CAPE5420M Fuel Processing 15 credits (Semester 1)

CAPE5610M Particle Process Engineering 15 credits (Semester 2)

CAPE5730M Materials Selection and Failure Analysis 15 credits (Semester 1)

CIVE5025M Advanced Concrete Design - MEng 15 credits (Semester 2)

CIVE5026M Deterioration and Maintenance of Concrete Structures (MEng) (15 credits) (Semester 2)

CIVE5977M Advanced Steel and Composite Design - (MSc) 15 credits (Semester 1)

MECH5510M Computational and Experimental Methods 15 credits (Semester 1)

MECH5550M Research Methods 15 credits

Other approved modules may be added to the list of optional modules from time to time.

Candidates will be permitted to proceed to assessment for transfer to full PhD status if they achieve 50% in all assessed credit-bearing modules.

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.

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

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

**Learning Outcomes / Transferable Key Skills / Learning Context / Assessment
– overall programme PhD and MSc (Nuclear Fuel Cycle)**

1. Learning Outcomes

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

- discover, interpret and communicate new knowledge through original research and/or scholarship of publishable quality which would satisfy peer review;
- present and defend research outcomes which extend the forefront of a discipline or relevant area of professional practice;
- demonstrate systematic and extensive knowledge of the subject area and expertise in generic and subject/professional skills;
- take a proactive and self reflective role in working and to develop professional relationships with others where appropriate;
- independently and proactively formulate ideas and hypotheses and to design, develop, implement and execute plans by which to evaluate these;
- critically and creatively evaluate current issues, research and advanced scholarship in the discipline;
- demonstrate systematic knowledge of and be able to critically assess, analyse and engage with the ethical and legal context of their research and any ethical and legal implications of their research;
- understand the baseline and advanced principles of a particular engineering discipline (e.g. Chemical, Civil, Mechanical) and how these are applied in the nuclear industry;
- perform accurate analyses, within the rigorous standards expected by the nuclear industry;
- define problems and develop and evaluate solutions for both basic and complex engineering issues in the nuclear industry;
- have demonstrated the capability to use techniques to acquire and analyse data and engineering information relevant to the nuclear industry;
- demonstrate the range of professional competencies that are relevant to the nuclear industry and show a clear understanding of the regulatory, safety and professionalism expectations of that industry.

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

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 (Nuclear Fuel Cycle) Outcomes

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 relevant to the discipline and/or to demonstrate a sophisticated understanding of concepts, information and techniques at the forefront of the discipline;
- exhibit mastery in the exercise of generic and subject-specific intellectual abilities;
- demonstrate a comprehensive understanding of techniques applicable to their own research or advanced scholarship;

INTEGRATED DEGREE OF PHD AND MSC (NUCLEAR FUEL CYCLE)

- take a proactive and self-reflective role in working and to develop professional relationships with others;
- formulate ideas and hypotheses proactively and to develop, implement and execute plans by which to evaluate these;
- evaluate critically and creatively current issues, research and advanced scholarship in the discipline.

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.