

Programme of study for the Integrated degree of PhD and MSc (Chemical Process Research and Development)¹

Year One (a total of 120 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) (including literature review and PhD proposal).
- Compulsory training and skills module:
CHEM5476M Laboratory Rotation Projects (60 credits).
Candidates undertake a number of non-credit bearing generic skills courses from a range provided by central training providers (SDDU, ISS, Library), Faculty or outside bodies, in accordance with current guidelines for the School of Chemistry
- Compulsory² specialised subject module as follows:
CHEM5226M Case studies in Fine Chemical and Pharmaceutical Synthesis (15 credits)
- PGRs to choose 45 credits from the following optional modules, chosen on the basis of the background of the PGR i.e. whether chemistry or engineering:

CHEM5116M Advanced Organic Synthesis for Fine Chemical and Pharmaceutical Synthesis (15 credits)

CHEM5126M Organic Synthesis for Pharmaceutical and Fine Chemical Synthesis (15 credits)

PEME5300M Process Chemistry and Chemical Technology (15 credits)

PEME5315M Batch Process Engineering (15 credits)

PEME5370M Pharmaceutical Analytical Techniques (15 credits)

PEME5380M Plant Design Project (15 credits)

In the unlikely event that a PGR does not have the appropriate background in chemistry or engineering to take these modules, then alternatives at a comparable level must be taken and agreed in advance with the CDT management group.

Year Two (a total of 60 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)
- Further non-credit bearing training courses will be taken as appropriate.
- Compulsory specialised subject modules, 60 credits selected from the following list chosen for their relevance to the PhD:

CHEM5216M Physical Organic Process Chemistry (15 credits)

CHEM5510M Advanced programmed learning in organic chemistry (10 credits)

CHEM5611M Advanced Topics in Chemical Biology (10 credits)

CHEM5612M Advanced Topics in Synthetic Chemistry (10 credits)

PEME5310M Multi-Scale Modeling (15 credits)

PEME5314M Chemical Reaction Processes (15 credits)

PEME5315M Batch Process Engineering (15 credits)

PEME5340M Advances in Chemical Engineering (15 credits)

PEME5360M Pharmaceutical Product Formulation (15 credits)

PEME5370M Pharmaceutical Analytical Techniques (15 credits)

Years Three and Four

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

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.

² If already taken as part of first degree, an alternative module at comparable level (agreed in advance with the CDT management group) must be studied.

INTEGRATED DEGREE OF PHD AND MSC (CHEMICAL PROCESS RESEARCH AND DEVELOPMENT)

- 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.

Learning Outcomes / Transferable Key Skills / Learning Context / Assessment – overall programme PhD and MSc (Chemical Process Research and Development)

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 in the field of Chemical Process Research and Development and produce scholarship of publishable quality which satisfies peer review;
- to present and defend research outcomes which extend the forefront of Chemical Process Research and Development and professional practice;
- to demonstrate systematic and extensive knowledge across the interdisciplinary themes of Chemistry and Chemical Engineering
- to take a proactive and self-reflective role in working and to develop professional relationships with others where appropriate;
- to independently and proactively formulate ideas and hypotheses and to design, develop,
- implement and execute plans by which to evaluate these;
- to critically and creatively evaluate current issues, research and advanced scholarship in the above themes;
- to 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;
- to 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 undertake an individual research project in the area of Chemical Process Research and Development, incorporating research in a specific area, but also including reference to the wider context of Chemical Process Research and Development policy, legislation and environmental impact;
- to 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;
- to evaluate their own achievement and that of others;
- to exhibit self-direction and effective decision making in complex and unpredictable situations;
- to demonstrate independent learning and the ability to work in a way which ensures continuing professional development;
- to 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.

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 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
- written style and overall presentation of the thesis.