Programme of study for the Integrated degree of PhD and MSc (Molecular- scale Engineering)[1]

Entry to the programme suspended with effect from 2015/16

Year One (a total of 150 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:

  ELEC5290M Cross-disciplinary research placement (30 credits)

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

  ELEC5225M Molecular-Scale Engineering (15 credits)
  ELEC5255M Nanofabrication and Characterisation (15 credits)
  CMNS5100M Generic Methodologies for Nanotechnology (15 credits)
  JUSH6730 Bionanomaterials (15 credits)
  JUSH6001 Translational Molecular Biology (15 credits)
  JUSH6100 Preliminary PhD Project (45 credits)

Year Two (a total of 30 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 from a range provided by central training providers (SDDU, ISS, Library), the Faculty or outside bodies.
- Compulsory specialised subject modules:
  30 credits selected from the following list chosen for relevance to PhD:

  ELEC5500M Micro- and Nano-Electromechanical Systems (15 credits) ELEC5650M
  Medical Electronics and E-health (15 credits)
  JUSH6750 Biophotonics and Bioimaging (15 credits)
  JUSH6108 Biopolymers and Biomaterials (15 credits)

Candidates will be permitted to proceed to assessment for transfer to full PhD status if they 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 titles of modular courses and the optional modular courses that are available.

[1] Entry to the programme suspended with effect from 2015/16. 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

Learning Outcomes / Transferable Key Skills / Learning Context / Assessment

1. Learning Outcomes

On completion of the Integrated PhD and MSc (Molecular-Scale Engineering) as a whole, PGRs should have shown evidence of being able:

- discover, interpret and communicate new knowledge through original research in the field of molecular-scale engineering and produce work of publishable quality which satisfies peer review;
- to present and defend research outcomes which extend the forefront of molecular-scale engineering discipline and professional practice;
- to 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 of a range of topics in the area of molecular-scale engineering;
- to take a proactive and self-reflective role in working and to develop professional relationships with others where appropriate;
- to evaluate critically and creatively published research in a range of learned society journals and other literature;
- 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 take a proactive and self-reflective role in working and to develop professional relationships with others where appropriate;
- to undertake an individual research project in the area of molecular-scale engineering;
- 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 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.
- 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
- the written style and overall presentation of the thesis.

Learning Outcomes / Transferable Key Skills / Learning Context / Assessment for MSc (Molecular-scale Engineering)

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:

- demonstrate in-depth specialist knowledge and understanding of techniques relevant to molecular-scale engineering, informed by knowledge at the forefront of the discipline;
- demonstrate and use a high level of analytical problem solving skills and competencies;
- use their knowledge and understanding of the underpinning engineering and scientific principles within the context of molecular-scale technology;
- use their analytical skills to solve non-routine molecular-scale engineering problems;
- demonstrate an appreciation of the context in which molecular-scale engineering is practised and managed, particularly an awareness of the management of quality and health & safety systems and environmental and sustainability issues;
- apply their skills in molecular-scale engineering to real world science and engineering problems;
- undertake project work independently 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

Masters (Taught)

- 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.