

## **Programme of study for Doctor of Philosophy – Molecules to Product 2023/24**

School responsible for the programme: Chemical and Process Engineering

**Criteria for Admission:** Minimum II(i) for MEng, MChem, MPhys or II(i) with a Merit MSc equivalent from areas including but not limited to: Chemical Engineering, Chemistry, Materials Science and Engineering, Physics, Mathematics and Statistics and Food Science. Applicants with a Bachelor degree with 1st class honours with a minimum of 2 years' experience in industry will also be considered.

### **Year One**

- The candidate will commence research under the direction of their supervision team and is expected to meet with their supervisors at least 10 times per year.
- PGRs undertake the following 6 non-credit bearing courses:  
  
Molecules to Product – An Introduction to Cross-Scale Challenges  
Functionalisation and Performance of Products  
Bonding to Bulk Measures - Benchmark Characterisation Techniques Applicable to the Chemicals Continuum  
Process Modelling and Data Analysis  
Essential Skills for Success  
Behavioural Aspects of Management Decision Making
- Annual Conference, ORBIT Training
- Month 4: Completion of the training plan
- Month 6: First Formal Progress Report
- Month 10: Submission of Transfer Report

Candidates will be required to undergo the formal assessment procedure for transfer to PhD status before the end of the second year of study.

### **Year 2**

- The candidate will continue research under the direction of their supervision team and is expected to meet with their supervisors at least 10 times per year.
- PGRs undertake the following 3 non-credit bearing courses:  
  
Holistic Process Design  
Applied Decision Making  
Advanced Technical Skills Development
- Minimum 3 months Industrial Placement or equivalent internship (or in year 3)
- Month 22: Draft Chapter/Journal Publication

### **Year Three**

- The candidate will continue research under the direction of their supervision team and expected to meet with their supervisors at least 10 times per year.
- PGRs undertake the following 2 non-credit bearing courses:  
  
Innovation and Enterprise  
Advanced Technical Skills Development

- Impact coaching through OD&PL, Annual Conference, Public Engagement and Outreach Activities
- Month 34: Draft Chapter/Journal Publication
- Minimum 3 months Industrial Placement or equivalent internship (or in year 2)

#### **Year Four**

- The candidate will continue research under the direction of their supervision team and expected to meet with their supervisors at least 10 times per year.
- Impact Workshop hosted by Centre for Process Innovation (CPI), Annual Conference, Public Engagement and Outreach Activities
- Month 48: Thesis submission or plan for submission within the 5 year deadline

### **Learning Outcomes / Transferable Key Skills / Learning Context / Assessment for PhD**

#### **1. Learning Outcomes**

On completion of the research programme 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 satisfies peer review
- to present and defend original research outcomes which extend the forefront of a discipline or relevant area of professional/clinical practice
- to demonstrate systematic and extensive knowledge of the subject area and expertise in generic and subject/professional skills
- 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 discipline
- 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/clinical 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**

This will include the critical analysis of, and decision making in, complex and unpredictable professional and/or clinical 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<sup>1</sup> 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/clinical 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/clinical 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

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<sup>1</sup> or alternative form of thesis