

PHD (ENGINEERING SCIENCE)

Overview

NFQ Level 10, Major Award

The PhD (Engineering Science) is a full-time programme that runs for a minimum of 36 months from the date of initial registration.

The PhD (Engineering Science) and Postgraduate Certificate in Innovation, Commercialisation and Entrepreneurship (<https://ucc-ie-public.courseleaf.com/programmes/pcice/#text>) is a 48 month full-time programme.

Programme Requirements

For information about modules, module choice, options and credit weightings, please go to Programme Requirements (p. 1).

Programme Requirements

The PhD (Engineering Science) is a thematic structured PhD programme and students are required to successfully complete a minimum of 30 ECTS of taught modules by the end of Year 3. The programme provides 2 streams of study for students. These are:

- PhD – Stream 1: 36 or 48 months, 30 credits of taught modules
- PhD – Streams 2: 48 months, 55 credits of taught modules

Both streams include a structured (i.e. taught modules) element designed to provide candidates with:

- advanced technical modules in areas related to the candidate's research;
- transferable skills modules to provide candidates with the communication skills required to work in industry and academia;
- an awareness of how innovative research couples with innovation, commercialisation and entrepreneurship (ICE).

Students registering for PhD – Stream 2 undertake a total of 55 taught credits including 30 credits of modules related to innovation, commercialisation and entrepreneurship. Successful completion of these modules leads to the students being awarded a Postgraduate Certificate in Innovation, Commercialisation and Entrepreneurship (<https://ucc-ie-public.courseleaf.com/programmes/pcice/#text>) (NFQ Level 9).

Programme Streams

All students on the PhD Engineering Science programme will register in the College of Science, Engineering and Food Science (SEFS) and follow one of **2 streams** leading to the qualifications of PhD:

- PhD - Stream 1 (36 months or 48 months)
- PhD - Stream 2 (48 months) - with requirement of completing ICE related modules to the total value of 30 credits leading to the award of Postgraduate Certificate in Innovation, Commercialisation and Entrepreneurship (NFQ Level 9).

It is expected that students would select the stream they will follow at the commencement of the programme. However, in certain cases, and subject to approval by the Thesis Committee and Colleges of SEFS and Business and Law; students may be permitted to switch between streams within 24 months of first registration.

The primary component of the PhD programme is innovative and original research. At the end of the programme, candidates are required to submit and defend a thesis on the candidate's research topic.

In addition, Stream 1 candidates are required to have passed **30** credits from modules selected according to the procedure below before submission of the PhD thesis is allowed. Stream 2 candidates are required to have passed **55** credits from modules selected according to the procedure below before submission of the PhD Thesis.

Module Selection and Personal Development Plan

The PhD in Engineering Science programme is multi-disciplinary in nature, student centric and give candidates flexibility to follow bespoke structured training relevant to their own individual research. Each PhD candidate will, in consultation with their Thesis Committee, define a Project and Professional Development Plan (PDP) during their first progress review meeting to be completed within 3 to 6 months of registration. This will include the taught modules to be completed, following Table 2 requirements, while still giving students flexibility and choice. The PDP is reviewed on an annual basis. The PDP defines the selection of modules to be taken to fulfil their credit requirements for the structured component of their PhD.

The candidate's academic and research progress will be reviewed regularly by the Thesis Committee in accordance with Tyndall Graduate Student Supervision Procedures and relevant UCC procedures including Progress Reviews for Research Students.

The tables below summarise the number of credits and module requirements for each stream and each year (these are indicative).

Table 1: Overall Credit Requirements for PhD Engineering Science

Year	Stream 1 Research	Stream 1 Taught Modules	Stream 2 Research	Stream 2 Taught Modules
Year 1	75	15	70	20
Year 2	75	15	70	20
Year 3	90	0	75	15
Year 4			90	
Total ECTS Credits	240	30	305	55

Table 2: Module Requirements/Stream

Module	Stream 1 Credits	Stream 2 Credits
Technical Modules	10	10
ICE Modules	5	30
Transferable Skills	5	5
Training		
Research Ethics	5	5
Training		
Module of Choice	5	5
Total Credits	30	55

Module Selection

As this is an inter-institutional programme, students have the opportunity to take modules delivered by other institutes. These modules will appear in the UCC Book of Modules and the name of the delivering institute will be listed.

The module selection must be chosen in conjunction with each students Thesis Committee.

Technical Modules

The modules offered to PhD (Engineering Science) candidates will include those listed below. Other relevant, discipline specific modules may be selected in agreement with the module co-ordinator and subject to the approval of the programme co-ordinator.

Code	Title	Credits
SE6001	Compound Semiconductor Device Fabrication	5
SE6006	Scientific Programming Concepts (PH502 - NUI Galway)	5
SE6009	High Performance Computing and Parallel Programming (PH504 - NUI Galway)	5
SE6014	Semiconductor Growth and Fabrication Technology	5
SE6015	Advanced Semiconductor Fabrication and Packaging	5
SE6020	Photonics Integrated Circuits Assembly and Packaging	5
SE6021	Introduction to Citizen Science	5

Responsible Research and Innovation

Students are required to complete 5 credits of Research Ethics training e.g. by completing PG6015 An Introduction to Research Integrity, Ethics and Open Science

Transferable Skills Modules

Students are required to complete at least 5 credits of relevant PG coded modules listed on the 'Modules for Postgraduate Training' section of the Calendar here (<https://ucc-ie-public.courseleaf.com/postgraduate/modules-postgraduate-training/>)

ICE Modules

Stream 1 students will take at least 1 of the ICE modules listed below. Stream 2 students will register for the Postgraduate Certificate in ICE and take modules to the value of 30 credits.

Students take 30 credits as follows:

Code	Title	Credits
BU6011		5
IS5004	IT Solution Selling and Digital Business	5
IS6306	Technology Business Planning	5
IS6307	Creativity and Opportunity Recognition	5
LW6104	Principles of Intellectual Property Law	5
MG6705	Marketing for Entrepreneurs	5

See also under the General Regulations for the PhD Degree. (<https://ucc-ie-public.courseleaf.com/postgraduate/doctor/general-regulations/>)

Examinations

Full details and regulations governing Examinations for each programme will be contained in the *Marks and Standards Book* and for each module in the *Book of Modules*.

Programme Learning Outcomes

Programme Learning Outcomes for PhD (Engineering Science) (NFQ Level 10, Major Award)

The following learning outcomes apply to all candidates on the programme.

On successful completion of this programme, students should be able to:

- Demonstrate their ability to advance knowledge in materials, nanoscience, microelectronics, photonics and/or their applications as evidenced by a body of original research described in a doctoral thesis;
- Identify important concepts from affiliated scientific and engineering disciplines and to incorporate these concepts into research projects as required;
- Effectively communicate and present scientific and technological results to inform specialist and non-specialist audiences and be able to express the value of their research to society;
- Work effectively as an individual, in teams and in multi-disciplinary settings;
- Execute the steps needed to identify and protect intellectual property that may arise from original research.