

Programme of study for Doctor of Philosophy – Physics Studies

Taught Components Year 1

Year One (a total of 120 credits, of which a minimum of 90 credits must be level M, in taught modular courses will be taken)

- **Compulsory training and skills modules (30 credits)**

PHYS5431M Current Research Topics in Physics (15 credits)

PHYS5019M Advanced Literature Review (15 credits)

- **Optional Modules (60-90 credits)**

Level 3

PHYS3777 Advanced Experimental Techniques and Analysis (30 credits)

Level 5

PHYS5016M Soft Matter Physics: Liquid Crystals (15 credits)

PHYS5017M Many Body Quantum Physics (15 credits)

PHYS5100M Winds, Bubbles and Explosions (15 credits)

PHYS5116M Bionanophysics 2: Advanced Bionanophysics Research (15 credits)

PHYS5300M Superconductivity (15 credits)

PHYS5342M Soft Matter Physics: Polymer, Colloids and Glasses (15 credits)

PHYS5360M Quantum Transport in Nanostructures (15 credits)

PHYS5380M Quantum Field Theory (15 credits)

PHYS5390M General Relativity (15 credits)

PHYS5410M Quantum Information Science & Technology (15 credits)

PHYS5800M Quantum Optics (15 credits)

Postgraduate researchers (PGRs) who take 60-75 credits of the above optional modules must take an additional 30-15 credits of optional modules, recommended by the supervision team, by no later than Week 4 after the start of study, and relevant to the research being undertaken.

These will not be restricted to the School of Physics and Astronomy, but must be Science, Technology, Engineering and Mathematics (STEM) related subjects and are subject to consideration and approval of the supervision team, programme manager and confirmation from the School.

PGRs will be required to pass at least 90 taught credits in Year One in order to progress on the programme. Those who do not complete the above taught requirements within Year One of study will not be able to proceed to the degree of PhD, but may be eligible instead for the award of a Postgraduate Certificate or Postgraduate Diploma in Physics Studies.

PGRs can also audit modules in the STEM-related subjects on an ad-hoc basis, subject to the approval of the supervision team, programme manager and confirmation from the School. These modules will not be assessed and will not form part of the Postgraduate Certificate or Diploma.

- In addition to the taught modules the candidate will commence research under the direction of their supervision team

Year 2

In addition to the Year One progression requirement, PGRs will be required to successfully transfer to full PhD status by no later than Month 24 in order to progress on the programme.

Years Three and Four

The candidate will continue research under the direction of their supervision team.

Learning Outcomes / Transferable Key Skills / Learning Context / Assessment for Postgraduate Certificate / Diploma

1. Learning outcomes

On completion of the programme students should have provided evidence of being able to:

- demonstrate in-depth specialist knowledge of techniques relevant to the discipline or to demonstrate an advanced understanding of concepts, information and techniques informed by knowledge across, or in aspects at, the forefront of the discipline;
- exhibit competence in the exercise of generic and subject-specific intellectual abilities;
- demonstrate an advanced understanding of techniques applicable to their own research area of specific interest within the broader discipline;
- proactively to formulate ideas and hypotheses and to evaluate these;
- evaluate current issues and research in the discipline.

2. Transferable (Key) Skills

Postgraduate Diploma & Postgraduate Certificate students 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. Assessment

Achievement for the Postgraduate Diploma & Postgraduate Certificate will be assessed by a variety of methods in accordance with the learning outcomes of the programme and will involve the achievement of the students in:

- 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 received opinion;
- making sound judgements whilst understanding the limitations on judgements made in the absence of complete data.

Learning Outcomes / Transferable Key Skills / Learning Context / Assessment for Doctor of Philosophy

1. Learning Outcomes

On completion of the research programme students should have shown evidence of being able:

- To enhance language skills in the context of a STEM research environment, relevant to communicating science (written and oral)
- To enhance the foundation knowledge relevant to the research project through formal taught units.
- 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

Students 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 students 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

Students 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:

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- 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