The School of Mechanical & Manufacturing Engineering has a diverse rich history of impactful research in the areas of Mechanical & Manufacturing Engineering. The outputs from this are evident in the many top ranking journal papers, books, patents, and research awards emanating from this research. Most significantly many of the research projects involve close ties with industry, multidisciplinarity, international collaboration, and the development of the cutting edge technologies required for next generation engineering products and services. Specific areas of research strength within the School include Advanced Processing Technologies and Bioengineering. Out structured PhD programmes enable postgraduate students to complement their research will the important discipline specific and generic skills such as communication, commercialisation, and entrepreneurship.

This document details a suggested doctoral pathway for graduate researchers in the School of Mechanical & Manufacturing Engineering. While the main focus for each research candidate is to complete an original research project, students are also supported in developing a range of skills and competencies through taught modules and other learning opportunities.

During registration, all research students may take a mix of credit bearing modules (Graduate Training Elements, GTEs). Other non-accredited educational opportunities such as seminars, workshops, and short courses are also available. These opportunities provide both discipline specific and transferable skills and knowledge to support students in their research and enhance their research qualification. Engagement in these activities is an important aspect of the graduate research experience.

Students who complete a minimum of 20 GTE credits will be recognised as having completed a structured PhD. At least one module should be from the list of discipline specific modules and one from the list of transferable skills modules. The modules chosen on the structured pathway should be discussed and agreed in the first instance with the supervisor and progress reported on the annual PGR2 form. Once approval has been given, the student can register for their chosen GTE(s) during the online registration process.
School of Mechanical & Manufacturing Engineering

Structured Doctoral Pathway
2016/17

**Discipline Specific Skills**

- MM523: Product Design, Development & Value Analysis - 7.5 ECTS (Sem 1)
- MM530: Surface Engineering & Tribology - 7.5 ECTS (Sem 1)
- MM584: Manufacturing System Simulation - 7.5 ECTS (Sem 1)
- MM532: Computational Thermo-Fluid Dynamics - 7.5 ECTS (Sem 2)
- MM524: Advanced FEA - 7.5 ECTS (Sem 2)
- MM555: Manufacturing Process Analysis & Tool Design - 7.5 ECTS (Sem 2)
- MM600: LabVIEW, Data Acquisition, Analysis & Control - 7.5 ECTS (Sem 2)

- MM421: Finite Element Analysis - 7.5 ECTS (Sem 1)
- MM432: Heat Transfer & Fluid Mechanisms - 7.5 ECTS (Sem 1)
- MM453: Manufacturing Automations - 5 ECTS (Sem 1)
- MM401: Mechanical Engineering Systems - 7.5 ECTS (Sem 2)
- MM459: Robotics - 5 ECTS (Sem 2)
- MM485: Operations Research Methods - 7.5 ECTS (Sem 2)
- MM451: Design for Manufacture and Assembly - 7.5 ECTS (Sem 2)

**Transferable Skills**

- GS602/a: Postgraduate Tutoring Principles and Practice - 5 ECTS
- GS604: Research Ethics - 5 ECTS
- GS601: IP & Commercialisation - 5 ECTS
- HR601: Leadership in the Research Environment - 5 ECTS
- GS606: Enterprise Experience for Graduate Researchers - 10 ECTS
- EE507: Entrepreneurship for Engineers - 7.5 ECTS
- LC600: English for Academic Purposes - 5 ECTS
- MM533: Research Practice & Methodology - 7.5 ECTS
- CA636: Computing & Engineering Seminar Series - 5 ECTS
- CS551A: Advanced Analytical Techniques - 2.5 ECTS
- CS507A: Advanced Experimental Data Processing using Microsoft EXCEL - 5 ECTS

Students are also encouraged to engage with centrally and locally offered workshops as seminars which align with their development needs.