



Elective Pathways

MATHEMATICS

These pathways have been created to provide guidance for **Bachelor of Engineering (Honours)** and **Bachelor of Surveying (Honours)** students wishing to specialise in a study area with their elective courses. **Please note** that these pathways are suggestions only and will not be noted formally on the final degree certificate.

Students are welcome to enrol in any elective provided that they satisfy the pre-requisites. For a full list of UON courses, [visit the course handbook](#).

Discrete Modelling

Concepts from logic, algebra and graph theory are embodied in digital computers through the design of their hardware and software. The Discrete Mathematics pathway provides an understanding of these foundations of computer science and computer engineering that enables more flexible and powerful use of computers. This pathway is suitable for students of engineering who will be working with computers. Graduating students will have enhanced understanding of the subjects of their engineering major and be more productive in future industrial or academic settings. Emphasis is on the development of skills in formal reasoning and the conceptual understanding that facilitates ongoing learning of new developments.

Suggested courses:

MATH2320	Linear Algebra
MATH3120	Algebra
MATH3170	Number Theory
MATH1510	Discrete Mathematics
MATH1800	Mathematical Modelling

Pre-requisites/Assumed knowledge:

- *Prior to enrolment, students should ensure that they meet course requirements in relation to pre-requisites and assumed knowledge by referring to the [course handbook](#).*

Pathway available in the following degrees:

- ✓ Chemical
- ✓ Civil
- ✓ Computer Systems
- ✓ Electrical and Electronic
- ✓ Environmental
- ✓ Mechanical
- ✓ Mechatronics
- ✓ Software
- ✓ Surveying

Foundations of Signal Processing

Modern signal processing is core to the new information economy. The data deluge of the new century provides new and exciting challenges for practitioners in industry and academia. The Foundations of Signal Processing pathway provides engineering students with the essential mathematical and analytical tools required for meaningful work in this booming area of research and development.

This pathway is suitable for engineering students engineering who wish to work at the cutting-edge of signal processing research and the development of algorithms for signal processing applications. Graduating students will have enhanced understanding of the subjects of their engineering major and be more productive in future industrial or academic settings. Emphasis is on the development of foundational mathematical skills in the area.

Suggested courses:

MATH2320	Linear Algebra
MATH2330	Analysis
MATH3205	Fourier Analysis
MATH3242	Complex Analysis

Pathway available in the following degrees:

- ✓ Chemical
- ✓ Computer Systems
- ✓ Electrical and Electronic
- ✓ Mechanical
- ✓ Mechatronics

Pre-requisites/Assumed knowledge:

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Modelling with Differential Equations

Differential equations provide flexible models of real-world phenomena and are ubiquitous in scientific and engineering applications. Modelling with differential equations provides one of the most effective methods of developing an understanding of the way the natural world works and provides a means of making sensible predictions of the behaviour of systems, as well as a reliable tool for design of systems.

This pathway is suitable for engineering students who wish to benefit from the insights that modelling with differential equations provides. Graduating students will have an enhanced understanding of the subjects of their engineering major and be more productive in future industrial or academic settings. Emphasis is on the development of strong modelling, analytical and interpretive skills.

Suggested courses:

MATH2320	Linear Algebra
MATH2330	Analysis
MATH2800	Differential Equations
MATH3700	Advanced Differential Equations

Pathway available in the following degrees:

- ✓ Chemical
- ✓ Civil
- ✓ Computer Systems
- ✓ Electrical and Electronic
- ✓ Mechanical
- ✓ Mechatronics

Pre-requisites/Assumed knowledge:

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Operations Research

Often known as the “science of better”, Operations Research (OR) is the cornerstone of effective decision making. OR provides the basis for decision support in strategic and operational planning, resulting in more productive systems in many key sectors. OR improves efficiency and effectiveness and has enhanced organisations and experiences all around us, from more cost effective scheduling of airline crews to the design of less intrusive cancer radiation therapy treatments, from two-person start-ups to Fortune 500 companies, from global resource planning to optimising local postal delivery routes.

Suggested courses:

MATH1510	Discrete Mathematics
STAT2110	Engineering Statistics
MATH3800	Optimisation
STAT3100	Systems Thinking for an Integrated Workforce
STAT2020	Predictive Analytics

Pre-requisites/Assumed knowledge:

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Pathway available in the following degrees:

- ✓ Chemical
- ✓ Civil
- ✓ Computer Systems
- ✓ Electrical and Electronic
- ✓ Environmental
- ✓ Mechanical
- ✓ Mechatronics
- ✓ Software
- ✓ Surveying