

UNIT 3 & 4 SPECIALIST MATHEMATICS

Specialist Mathematics is intended to provide an appropriate foundation for students wishing to undertake further study in, but not limited to, areas such as Science and Engineering. Enrolment in Specialist Mathematics requires a concurrent enrolment in, or previous completion, of Mathematical Methods.

UNIT 3

In this unit students will cover proofs using various strategies such as direct, contrapositive and induction. Students will solve and graph inverse circular functions, reciprocal functions, rational functions and other simple quotient functions and the absolute value function. They will investigate the arithmetic, geometry and algebra of complex numbers, including polar form; points and curves in the complex plane; introduction to factorisation of polynomial functions over the complex field; and an informal treatment of the fundamental theorem of algebra. Students will cover the arithmetic and algebra of vectors, linear dependence and independence of a set of vectors and proof of geometric results using vectors.

AREA OF STUDY

- Discrete mathematics
- Functions, relations and graphs
- Algebra, number and structure

OUTCOMES

Outcome 1: Define and explain key concepts as specified in the content from the areas of study and apply a range of related mathematical routines and procedures.

Outcome 2: Apply mathematical processes in non-routine contexts, including situations with some open-ended aspects requiring investigative, modelling or problem-solving techniques or approaches, and analyse and discuss these applications of mathematics.

Outcome 3: Apply computational thinking and use numerical, graphical, symbolic and statistical functionalities of technology to develop mathematical ideas, produce results and carry out analysis in situations requiring investigative, modelling or problem-solving techniques or approaches.

UNIT 4

In this unit students will cover advanced calculus techniques for analytic and numeric integration of a range of functions and their application in a variety of situations including area, volume and kinematics. They will investigate vector representation of curves in the plane and vector kinematics in one and two dimensions. Students will cover techniques for analytic and numeric differentiation of a range of functions and their application in a variety of theoretical and practical situations including curve sketching and differential equations. They will cover statistical inference related to the definition and distribution of sample means, simulations and confidence intervals for means and will include the investigation of hypothesis testing for a population mean.

AREA OF STUDY

- Calculus
- Space and measurement
- Data analysis, probability and statistics

OUTCOMES

Outcome 1: Define and explain key concepts as specified in the content from the areas of study and apply a range of related mathematical routines and procedures.

Outcome 2: Apply mathematical processes in non-routine contexts, including situations with some open-ended aspects requiring investigative, modelling or problem-solving techniques or approaches, and analyse and discuss these applications of mathematics.

Outcome 3: Apply computational thinking and use numerical, graphical, symbolic and statistical functionalities of technology to develop mathematical ideas, produce results and carry out analysis in situations requiring investigative, modelling or problem-solving techniques or approaches.