Approved courses available in Semester One to students intending to take the Alternative Pathway to Engineering

Students are encouraged to choose a course which would advance their preferred Bachelor of Science should they not be selected for Engineering.

BIOSCI 107 - Biology for Biomedical Science: Cellular Processes and Development

The cellular basis of mammalian form and function including embryology and development. Particular emphasis will be placed on the cellular components of the blood, neural, muscular, reproductive, immune and supporting systems, and how they contribute to the structure and function of the body as a whole.

CHEM 110 - Chemistry of the Living World

A foundation for understanding the chemistry of life is laid by exploring the diversity and reactivity of organic compounds. A systematic study of reactivity focuses on the site and mechanism of reaction including application of chemical kinetics. A quantitative study of proton transfer reactions features control of pH of fluids in both living systems and the environment.

Recommended preparation: It is recommended that students with a limited background in chemistry take CHEM 150 prior to CHEM 110

COMPSCI 101 - Principles of Programming

An introduction to computers and computer programming in a high-level language. The role of computers and computer professionals in society is also introduced. The course is intended for students who may wish to advance in Computer Science or in Information Systems and Operations Management.

Restriction: COMPSCI 107

COMPSCI 120 - Mathematics for Computer Science

Basic mathematical tools and methods needed for computer science are introduced. Elementary mathematical skills for defining, analysing and reasoning with abstracts objects used in programming are developed. Topics include integers and rational numbers, strings and languages, methods of proof (including induction), propositional logic, and elementary introductions to graphs, trees, counting and probability.

Prerequisite: MATHS 102 or at least 13 credits in Mathematics at NCEA Level 3 or D in CIE A2 Mathematics or C in CIE AS Mathematics or 3 out of 7 in IB Mathematics
Restriction: Cannot be taken after COMPSCI 225, MATHS 255.

COMPSCI 130 - Introduction to Software Fundamentals

Fundamental programming techniques and processes, such as conditionals, iteration, recursion, functions, testing and debugging. Efficient ways to organise and manipulate data, including sorting and searching algorithms. Writing software that uses and implements common abstract data types such as lists, stacks, queues, dictionaries and trees.

Prerequisite: COMPSCI 101, or Achievement Standard NCEA Level 3: Digital Technologies and Programming: 91637 Develop a complex computer program for a specified task
Restriction: COMPSCI 105, 107

EARTHSCI 105 - Natural Hazards in New Zealand
New Zealanders are exposed to extreme natural events and processes including earthquakes, volcanic eruptions, weather bombs, storm surge, tsunami, flooding, landslides and erosion. The physical context for each hazard is provided, drawing on the disciplines of geology, geomorphology and climatology. The frequency and magnitude of natural hazards for New Zealand are considered using different sources. Impacts on modern society are discussed using case studies and scenario modelling.
Restriction: GEOG 105, 105G, GEOLOGY 110

MATHS 108 - General Mathematics 1
A general entry to Mathematics for commerce and the social sciences, following Year 13 Mathematics. MATHS 108 covers selected topics in algebra and calculus and their applications, including: linear functions, linear equations and matrices; functions, equations and inequalities; limits and continuity; differential calculus of one and two variables; integral calculus of one variable.
Recommended preparation: It is recommended that NCEA students have a rank score of at least 210 and a merit or excellence in the Differentiation Standard 91578.
Prerequisite: MATHS 102 or at least 13 credits in Mathematics at NCEA Level 3 including the Differentiation Standard 91578, or D in CIE A2 Mathematics or C in CIE AS Mathematics or 3 out of 7 in IB Mathematics.
Restriction: MATHS 153, 208, 250, ENGGEN 150, ENGSCI 111. More than 15 points from MATHS 120 and 130. May not be taken with, or after, MATHS 110, 150
If you have previously passed MATHS 153, please contact the Faculty for advice.

MATHS 120 – Algebra
A foundation for further mathematics courses, essential for students intending to major in Mathematics, Applied Mathematics, Statistics, Physics, or who want a strong mathematical component to their degree. Develops skills and knowledge in linear algebra, together with an introduction to mathematical language and reasoning, including complex numbers, induction and combinatorics.
Recommended preparation: Merit or excellence in the Differentiation Standard 91578 at NCEA Level 3.
Prerequisite: B- in MATHS 108 or 110, or A+ in MATHS 102 or at least 18 credits in Mathematics at NCEA Level 3 including at least 9 credits at merit or excellence, or B in CIE A2 Mathematics, or 5 out of 7 in IB Mathematics or equivalent.
Restriction: nil

MATHS 130 – Calculus
A foundation for further mathematics courses, essential for students intending to major in Mathematics, Applied Mathematics, Statistics, Physics, or who want a strong mathematical component to their degree. Develops skills and knowledge in calculus of functions of a single variable.
Recommended preparation: Merit or excellence in the Differentiation Standard 91578 at NCEA Level 3.
Prerequisite: B- in MATHS 108 or 110, or A+ in MATHS 102 or at least 18 credits in Mathematics at NCEA Level 3 including at least 9 credits at merit or excellence, or B in CIE A2 Mathematics, or 5 out of 7 in IB Mathematics or equivalent.
Restriction: nil

MATHS 162 - Computational Mathematics
An introduction to computational mathematics and programming in MATLAB. The course will introduce some basic concepts in computational mathematics and give applications that include cryptography, difference equations, stochastic modelling, graph theory and Markov chains.
Corequisite: 15 points from MATHS 108, 110, 120, 150, 153, ENGSCI 111, ENGGEN 150

PHYSICS 120 – Advancing Physics 1
For students progressing in physical science. Key topics are mechanics, energy, rotation, oscillations, waves and thermodynamics. This is a calculus based course, focusing on fundamental principles, problem solving and hands-on exercises.
Restriction: PHYSICS 160

PHYSICS 121 – Advancing Physics 2 – (only available in Semester Two in 2025)
For students progressing in physical science. Key topics are electrostatics, electromagnetism, circuits, optics, relativity and quantum mechanics. This is a calculus based course, focusing on fundamental principles, problem solving and hands-on exercises.
Prerequisite: PHYSICS 120, or 24 credits in the Mechanics (91524), Electricity (91526), Differentiation (91578), Integration (91579) standards in NCEA Level 3 at merit or excellence, or equivalent with departmental approval.

PHYSICS 140 - Digital Fundamentals
An introduction to the physical basis of modern computing for Computer Science students and anyone with an interest in modern Information Technology. Key topics are Boolean Algebra, logic circuits, and digital information processing. Hands-on laboratory work is a key component of the course. No prior electronics or programming knowledge is assumed.
Restriction: PHYSICS 219, 243

STATS 101 (or 108) - Introduction to Statistics
Intended for anyone who will ever have to collect or make sense of data, either in their career or private life. Steps involved in conducting a statistical investigation are studied with the main emphasis being on data analysis and the background concepts necessary for successfully analysing data, extrapolating from patterns in data to more generally applicable conclusions and communicating results to others. Other topics include probability; confidence intervals, statistical significance, t-tests, and p-values; nonparametric methods; one-way analysis of variance, simple linear regression, correlation, tables of counts and the chi-square test.
Restriction: STATS 102, 107, 108, 191