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 101 - Essential Biology: From Genomes to Organisms
An introduction to the structures and processes which are common to micro-organisms, animals and plants at the cellular, molecular and biochemical levels. Genetic principles and processes and an overview of evolution and evolutionary concepts are included.
This course assumes a knowledge of NCEA Level 3 Biology and at least NCEA Level 2 Chemistry.

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. 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 105 - Principles of Computer Science
Extends the programming skills of COMPSCI 101, covering more advanced data structures and their representation and manipulation. Topics include: dynamic data structures (lists, queues, stacks, trees, hashtables), recursion, sorting and searching.
Prerequisite: COMPSCI 101
Restriction: COMPSCI 107

COMPSCI 107 - Computer Science Fundamentals
The entry course to Computer Science for students with prior programming knowledge. It focuses on data structures and efficient ways to manipulate data. Topics include: a brief recap of programming concepts, recursion, regular expressions, data interchange, abstract data types, linear data structures (lists, stacks and queues), non-linear data structures (heaps, hash tables, trees), searching and sorting.
Prerequisite: Achievement Standards NCEA Level 3: Digital Technologies and Programming: 91637 Develop a complex computer program for a specified task, 91636 Demonstrate understanding of areas of computer science, or equivalent, or Departmental approval
Restriction: COMPSCI 101, 105

EARTHSCI 103 - Dynamic Earth
Examination of geologic processes that have shaped Earth and life through time, and their impact on modern society. Topics include: earthquakes, plate tectonics, volcanic eruptions, tsunamis, landslides, meteorites and planets, mass extinctions and evolution of life. A practical introduction to rocks, minerals and fossils provides insights into Earth’s past and important modern resources.
Restriction: GEOLOGY 101, 102, 103, 104
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

GEOG 101 – Earth Surface Processes and Landforms
Understanding of the functioning of natural systems at the Earth’s surface and human interactions with these systems. Examines the operation and interaction between Atmospheric, Hydrological, Ecological and Geomorphic systems. Environmental processes are an integrating theme. Topics include: climate and hydrological systems, ecological processes; surface sediment cycle; and processes governing development and dynamics of major landform types.
Restriction: GEOG 151

GEOG 104/104G - Cities and Urbanism
What makes a great city? This course explores 'urbanism' in both historical and contemporary cities to determine the essence of urbanity and the way that citizens (and visitors) experience city life. The dynamics and character of cities are considered in terms of their built environment, economic systems, population, human and cultural diversity and planning policies and practices.

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 complete the Differentiation Standard 91578 and/or the Simultaneous Equations Standard 91587 at NCEA Level 3
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: MATHS 153, 208, 250, ENNGEN 150, ENGSCI 111. May not be taken with, or after, MATHS 150
If you have previously passed MATHS 153, please contact the Faculty for advice.

MATHS 110 - Mathematics for Science
A general entry to Mathematics for the physical sciences, following Year 13 Mathematics. Covers selected topics in algebra and calculus and their application to the physical sciences.
Prerequisite: MATHS 102 or 13 credits in Mathematics at NCEA Level 3, or D or better in Cambridge A2 Mathematics, C or better in AS Mathematics, pass in International Baccalaureate Mathematics, or equivalent.
Restriction: MATHS 108, 153, 208, 250, ENNGEN 150, ENGSCI 111. May not be taken with, or after, MATHS 150

MATHS 150 - Advancing Mathematics 1
The gateway to further mathematics courses for students intending to major in mathematics, statistics, physics, economics, finance or mathematical biology. It gives an introduction to the use of careful mathematical language and reasoning in the context of calculus of functions of a single variable and of linear algebra in finite dimensional spaces. Recommended preparation for MATHS 250.
Recommended preparation: It is strongly recommended that NCEA students have a merit or excellence in the Differentiation Standard 91578 at NCEA Level 3.
Prerequisite: B- in MATHS 108, or A- in MATHS 102, or any pass in MATHS 208, 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: MATHS 153, ENNGEN 150, ENGSCI 111
If you have previously passed MATHS 153, please contact the Faculty for advice.
MATHS 162 - Modelling and Computation
In this introduction to mathematical modelling and scientific computing, students will learn how to formulate mathematical models and how to solve them using numerical and other methods. A core course for students who wish to advance in Applied Mathematics.

Corequisite: One of MATHS 108, 150, 153, ENGSCI 111, ENGGEN 150

PHYSICS 120 – Advancing Physics 1
A course designed for students either advancing in physical science or with a major interest in field studies. It covers basic aspects of motion and its causes, electrostatics, geometric optics, as well as the production, transformation and propagation of energy in its thermal and mechanical forms. Physics and mathematics at NCEA level 3 or equivalent or a pass in PHYSICS 102 are recommended for students intending to enrol in this course. It is a recommended preparation for PHYSICS 150.

Restriction: PHYSICS 160

PHYSICS 140 - Digital Fundamentals
Logic components, Boolean algebra, combinational logic analysis and synthesis, synchronous and asynchronous sequential logic analysis and design, digital subsystems, computer organisation and design.

Restriction: PHYSICS 219, 243

PHYSICS 121 - Advancing Physics 2
For students progressing in physical science. Key topics are rotational motion, electromagnetism, circuits, relativity and quantum mechanics. This is a calculus based course, focussing on fundamental principles, problem solving and hands-on exercises. Recommended preparation is PHYSICS 102 or NCEA Level 3 Physics and Mathematics, or equivalent.

Restriction: PHYSICS 150

PHYSICS 160 - Physics for the Life Sciences
Designed for students intending to advance their studies in the life sciences. Topics covered will be especially relevant to biological systems: mechanics, thermal physics, wave motion, electricity and instrumentation.

This course requires a knowledge of physics and mathematics to at least NCEA level 2.

Restriction: PHYSICS 120

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