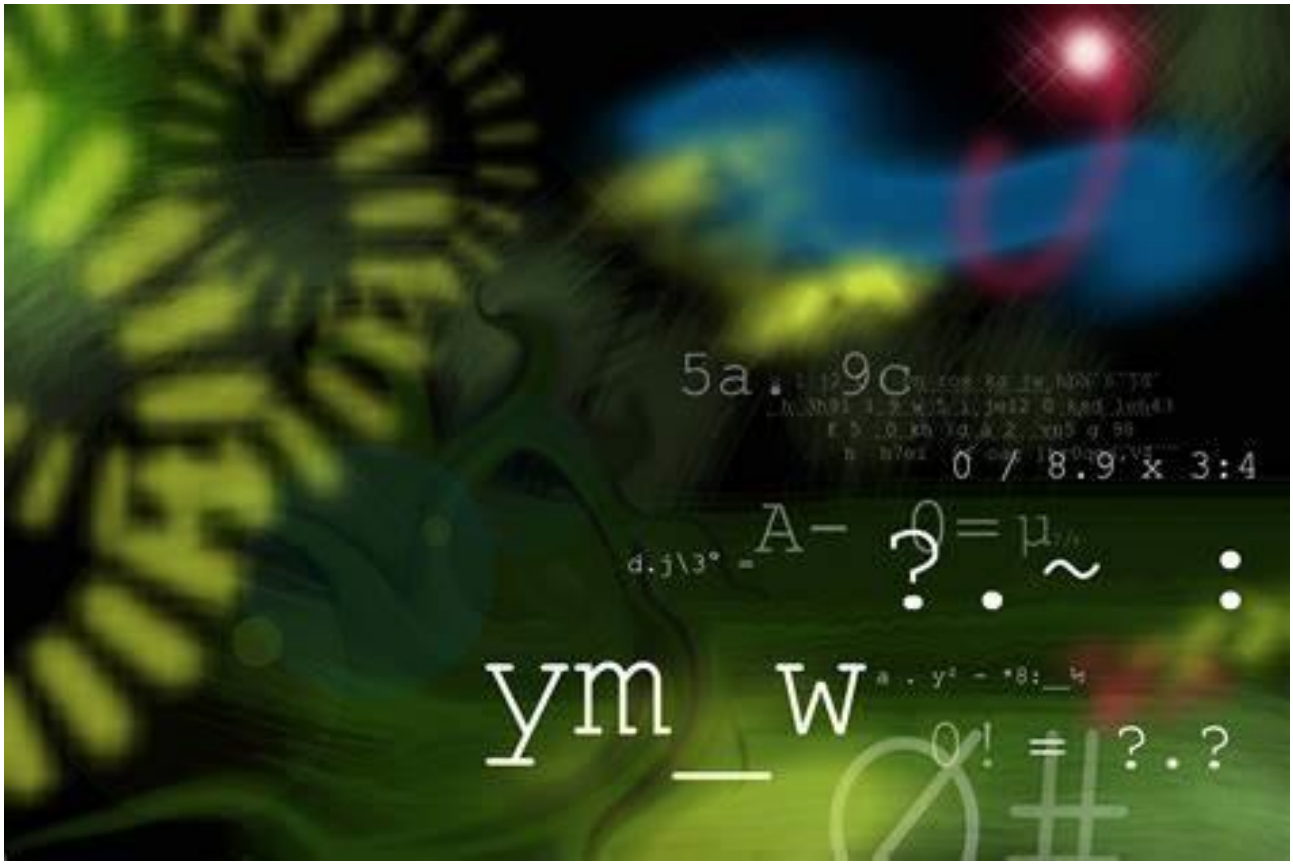
2026

Undergraduate courses

Mathematics, Statistics & Data Science



School of Mathematics and Statistics

Te Kura Mātai Tatauranga

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Updated August 2025

VICTORIA UNIVERSITY OF WELLINGTON
TE HERENGA WAKA

CONTENTS

BACHELOR OF SCIENCE (BSc)

Bachelor of Science Degree Requirements

Complete at least **360 points**, of which:

- At least 210 points must be from courses above 100-level, including
  - at least 120 points from courses listed for the BSc Schedule;
- At least 75 points must be from courses numbered 300-399; and
- At least 15 points must be from ENGR 121-123, 142, GEOG 115, MATH, PHYS, QUAN, STAT.

BACHELOR OF ARTS (BA)

Bachelor of Arts Degree Requirements

Complete at least **360 points**, of which:

- At least 240 points must be from courses listed from Part A of the BA Schedule;
- At least 80 points must be from 100-level courses listed for the BA;
- A maximum of 180 points can be at level 100; and
- At least 180 points must be at 200 and 300 level, with
  - at least 75 points from 300-level courses listed for the BA, and
  - of the 75 points, up to 15 may come from courses listed for another degree when they are taken to satisfy the requirements of an additional major subject from another degree.

*Note that Data Science and Mathematics courses are in Part B of the BA Schedule.

GRADUATE CERTIFICATE IN SCIENCE

Complete at least **60 points** from courses above 100 level from the BSc Schedule, of which at least 40 points must be at 300 level. With approval, you may substitute 20 points worth of courses from other programmes at the University.

GRADUATE DIPLOMA IN SCIENCE

Complete at least **120 points** from courses above 100 level from the BSc Schedule, of which at least 75 points must be at 300 level. With approval, you may substitute 30 points worth of courses from other programmes at the University.

PLEASE NOTE

CANCELLATION OF COURSES

The courses offered by the University and listed in this prospectus may be cancelled by the University as a result of insufficient resources or student demand, or if other unforeseen circumstances arise.

TIMETABLE CHANGES

Check the timetable online for confirmation of course times.
www.wgtn.ac.nz/students/study/timetable

ENTRY REQUIREMENTS 100-LEVEL MATHEMATICS AND STATISTICS

There are four levels of entry to Mathematics and Statistics courses:

1. Well-prepared calculus students may enrol directly in MATH 142 (Calculus 1B).
   You will need to have passed NCEA Level 3 Achievement Standards:
   - 3.6 (Differentiation, AS91578) achieved with excellence
   - 3.7 (Integration, AS91579)
   - one of 3.1 (Conics, AS91573), 3.3 (Trigonometry, AS91575), or 3.5 (Complex numbers, AS91577)
   - a Merit or Excellence grade in at least one of 3.1, 3.3, 3.5, or 3.7.

   If you don't have these qualifications (or their equivalent), you'll require MATH 141 (Calculus 1A) or QUAN 111 (Mathematics for Economics and Finance) or PHYS 101 (Introduction to Physics).

2. Reasonably well-prepared students who have gained 16 NCEA Level 3 Achievement Standard credits in Mathematics (or 12 credits in Mathematics excluding statistics standards, or some equivalent qualification) are given direct entry to MATH 141 (Calculus 1A), MATH 151 (Algebra) and MATH 161 (Discrete Mathematics). If you don't have these qualifications (or their equivalent) you need MATH 132 or an equivalent background in mathematics.

   Entry to MATH 177 (Probability and Decision Modelling) requires at least 12 NCEA Level 3 Achievement Standard credits in Mathematics, including 3.6 (Differentiation, AS91578) and 3.7 (Integration, AS91579). If you don't have these qualifications (or their equivalent), you need a pass in one of these courses: ENGR 121, MATH 141, or QUAN 111.

3. Less prepared students may enter MATH 132 (Introduction to Mathematical Thinking) and STAT 193 (Statistics in Practice). A pass in MATH 132 gives entry into MATH 141, 151 and 161.

4. Advanced students may be granted direct entry to 200-level courses. Entry is at the discretion of the appropriate programme director.

PREREQUISITES AND RESTRICTIONS

Starting at 200-level, courses are listed with prerequisites and restrictions.

Prerequisites are the courses that are required for entry into the course. For example, If STATXXX has (STATYYY, ZZZ) listed as prerequisites, then you must have passed STATYYY **AND** STATZZZ before you can enrol in STATXXX.

Restrictions are the courses that you **should not have already passed** before enrolling in the course. For example, if MATHXXX has MATHYYY listed as restriction, it probably means that MATHYYY contains more advanced material than MATHXXX. If you have already passed MATHYYY, or if you are currently enrolled in MATHYYY, then you will usually not be allowed to enrol in MATHXXX.

MATHEMATICS (MATH)

The BSc in Mathematics is a three-year qualification. Here, we describe the regulations concerning the MATH major within the degrees.

MAJOR REQUIREMENTS

MATH major requirements from 2022 onwards:

- MATH 142, MATH 151, MATH 161
- 15 points from (COMP 100-199, DATA 202, ENGR 222, MATH 245, STAT 293)
- 120 points from MATH 200-399, of which at least 60 points must be from MATH 300-399.

MATH major requirements before 2022*****:

- MATH 142, MATH 151, MATH 161
- 60 points from MATH 300-399
- 60 further points from MATH 200-399

***** Students enrolled in a MATH major before 2022 may graduate under the regulations in place when they enrolled.

MINOR REQUIREMENTS

MATH minor requirements from 2024 onwards:

- 60 points from MATH 200-399, ENGR 222 of which at least 15 points must be from MATH 300-399

MATH minor requirements before 2024*****:

- 60 points from MATH 200-399, DATA 202, ENGR 222, STAT 293 of which 15 points must be from MATH 300-399 and at most 15 points can be from DATA 202, ENGR 222 or STAT 293.

***** Students enrolled in a MATH minor before 2024 may graduate under the regulations in place when they enrolled.

STATISTICS (STAT)

The Statistics major can have a theoretical (mathematical statistics) emphasis, an applied emphasis, or incorporate computational modelling, depending on the courses you take.

MAJOR REQUIREMENTS

- MATH 177 or STAT 193; 15 further points from MATH 100-199, STAT 100-199
- (MATH 243 and MATH 277) or (STAT 292 and STAT 293); 30 further 200-level points from the BSc schedule or other approved courses
- STAT 332 or 393; 15 further points from STAT 300-399; 30 further 300-level points from (DATA 303, 304, MATH, STAT)

MATH 177 is needed for a major in **Statistics** with a **mathematical statistics** or **computational modelling** emphasis, and for a major in **Actuarial Science.**
STAT 193 is highly recommended for a major in **Statistics** with an **applied statistics** emphasis, and for a major in **Data Science**.

MINOR REQUIREMENTS

- One of (MATH 277, STAT 292) and one of (MATH 377, STAT 332, 393, 394)
- 15 further points from (DATA 303, 304, MATH 277, 377, STAT 292, 293, 300-399)
- 15 further points at 200- or 300-level from the BSc schedule.

ACTUARIAL SCIENCE (ACTS)

The role of an actuary is to quantify risk and uncertainty to help businesses and governments manage those risks. Actuaries are employed by banks, insurance companies, investment firms and other companies, including within the public service. They give advice on insurance, pension schemes, company mergers, the management of financial projects and investments.

The Actuarial Science major introduces students to the technical and professional aspects of actuarial science and may enable students to gain accreditation towards qualifying as an actuary with the Actuaries Institute of Australia.

Students enrolling in this major, available in both the Bachelor of Science (BSc) and Bachelor of Commerce (BCom), may consider taking it alongside a second major in Economics, Finance, Mathematics or Statistics. Graduates will be qualified to work in the fields of actuarial work, risk management, financial and statistical analysis.

MAJOR REQUIREMENTS

a. ACCY 130, ECON 130, 141, MATH 142, 177, (MATH 151 or at least a B+ in QUAN 111)
b. ACTS 201, ECON 201, FINA 201 or 202, MATH 277
c. ACTS 331, 332, 336, STAT 335

	Trimester 1	**Trimester 2**
Year 1	ACCY 130: Accounting for Decision Making ECON 141: Macroeconomic Principles MATH 141: Calculus 1A	ECON 130: Microeconomic Principles MATH 142: Calculus 1B MATH 151: Algebra MATH 177: Probability and Decision Modelling
	+ 15 further points	
Year 2	ACTS 201: Financial Mathematics ECON 201: Intermediate Microeconomics FINA 201: Introduction to Corporate Finance MATH 277: Mathematical Statistics	MATH 243: Multivariable Calculus
	+ 45 further points	
Year 3	ACTS 331: Topics in Actuarial Science 1 MATH 377: Probability and Random Processes	ACTS 332: Topics in Actuarial Science 2 ACTS 336: General Insurance Techniques STAT 335: Statistical Models for Actuarial Science
	+ 45 further points	

MINOR REQUIREMENTS

ACTS 201, MATH 277; two courses from ACTS 331, 332, 336.

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DATA SCIENCE (DATA)

Data literacy is an essential component of future citizenry - the ability to make sense of data, critique its use and communicate with and about it, are becoming hugely valuable skills. Data Science combines ideas from statistics, computing and mathematics to provide new insights that are crucial to the survival of businesses, governments and institutions that want to transform their data into information, insights and novel products. Pair your Data Science major alongside another subject to extract and provide meaningful insights to any field, including actuarial science, biology, chemistry, economics, geography, linguistics and media studies.

MAJOR REQUIREMENTS

a. DATA 101; one of (COMP 103, 132); one of (MATH 177, QUAN 102, STAT 193).
b. AIML 231; DATA 202; one of (MATH 277, QUAN 203, STAT 292), one further course from (AIML 232, COMP 261, GEOG 215, INFO 206, LSCI220, MATH 245, 251, 261, 277, PHIL 269, QUAN 201, 203, STAT 292, 293).
c. DATA 301, 303, one of (COMP 309, DATA 302, 305); one of (DATA 304, 306-399, AIML 331-339, COMP 307, ECON 303, GEOG 315, INFO 304, 307, 310, 311, 377, MARK 317, MATH 353, MGMT 315, 316, STAT 391, 392, 394, SWEN 304).

Sample programme for BSc major:

	Trimester 1	**Trimester 2**
Year 1	DATA 101: Introduction to Data Science STAT 193: Statistics in Practice MATH 141: Calculus 1A	COMP 132: Programming for the Natural and Social Sciences MATH 142: Calculus 1B MATH 151: Algebra MATH 177: Probability and Decision Modelling
Year 2	AIML 231 Techniques in Machine Learning STAT 292: Applied Statistics CYBR 171: Cybersecurity Fundamentals PHIL 269: Ethics and Data	DATA 202: Data Management & Programming GEOG 215: Introduction to GIS MATH 245: Computational Mathematics STAT 293: Applied Statistical Modelling
Year 3	DATA 303: Statistics for Data Science DATA 305: Machine Learning for Data Science STAT 391: Mathematical Models for Applied Statistics SCIS 211: Contemporary Issues in Science, Environment and Technology	DATA 301: Data Science in Practice DATA 351: Data Science Internship STAT 393: Linear Models STAT 394: Multivariate Statistics

MINOR REQUIREMENTS

One of (AIML 231, DATA 201), DATA 202, one course from (DATA 301, 302, 303, 305, COMP 309), and one further course from parts (b) or (c) of the major requirements.

PLANNING YOUR PROGRAMME

Course code	Course reference number	Title	Points	Trimester
MATH 151	**CRN 17161**	**ALGEBRA**	**15 PTS**	**T2**

Prerequisites: Courses you must have passed before taking this course.
Restrictions: You can't enrol in this course if you have passed any of the restricted courses.

Use this template to plan your programme. Start by adding in the core papers for your degree.

Year 1:							120 points
Year 2:							**120 points**
Year 3:							**120 points**

100-LEVEL COURSES

DATA 101	CRN 31056 CRN 31191	INTRODUCTION TO DATA SCIENCE	15 PTS	T1 T3
We live in an increasingly data-driven world with the volume of data generated annually following a roughly exponential trend. Data scientists find themselves in high demand because of their skills to derive valuable insights from data. But what exactly do they do? This course provides an overview of data science. You will gain an understanding of the skill set that data scientists possess. This includes understanding data sources and types, data wrangling, data visualisation, modelling, and communicating results. Aspects of privacy law and Māori data sovereignty relevant to data science are also introduced.				

ENGR 121	CRN 26052 CRN 31158	ENGINEERING MATHEMATICS FOUNDATIONS	15 PTS	T1 T2
Prerequisites:	(16 Achievement Standard credits NCEA Level 3 Mathematics) or (12 Achievement Standard credits NCEA Level 3 Mathematics excluding the statistics standards 91580, 91581, 91582, 91583, 91584) or MATH 132			
Restrictions:	Both one of (MATH 141/QUAN 111) and one of (MATH 151, MATH 161, MATH 177)			
An introduction to the range of mathematical techniques employed by engineers, including functions, calculus, linear algebra, vector geometry, set theory, logic and probability. This course emphasises engineering applications and modelling.				

ENGR 122	CRN 26053	ENGINEERING MATHEMATICS WITH CALCULUS	15 PTS	T2
Prerequisites:	ENGR 121 or MATH 141			
Restrictions:	(The pair MATH 142, MATH 151)			
Further mathematical techniques employed by electrical and electronic engineers, with a focus on methods of calculus, differential equations and linear algebra. There is an emphasis on engineering applications and use of software.				

ENGR 123	CRN 27044 CRN 31159	ENGINEERING MATHEMATICS WITH LOGIC AND STATISTICS	15 PTS	T2 T3
Prerequisites:	ENGR 121			
Restrictions:	The pair MATH 161 and (MATH 177, QUAN 102 or STAT 193)			
Mathematical techniques employed by cybersecurity and software engineers, including combinatorics, logic, probability distributions, model fitting and estimation. The course emphasises engineering applications.				

MATH 132	CRN 17150 CRN 17286	INTRODUCTION TO MATHEMATICAL THINKING	15 PTS	T1 T3
Restrictions:	ENGR 121-123, MATH 100-199, QUAN 111			
This course provides an introduction to, or review of, fundamental skills and ideas in mathematics. The course is designed for students who require some mathematics in their degree, but who may not have a lot of mathematical experience. Topics include elementary arithmetic, algebra, coordinate geometry, and functions. There is an emphasis on mathematical ideas and how they have evolved: the goal is not only to apply mathematical tools correctly, but to understand them.				

MATH 141	CRN 17151	CALCULUS 1A	15 PTS	T1
Prerequisites:	(16 Achievement Standard credits NCEA Level 3 Mathematics) or (12 Achievement Standard credits NCEA Level 3 Mathematics excluding the statistics standards 91580, 91581, 91582, 91583, 91584) or MATH 132			
Restrictions:	ENGR 122, MATH 142, QUAN 111			
Determining the rate of change of a function as its dependent variable changes is a key question in many sciences. It is also the basis for differential calculus, which is the first part of mathematical analysis. This course provides a thorough development of differential calculus. It builds on the ideas of functions and limits to define derivatives, and derives rules for computing them. These rules are demonstrated in scientific applications.				

MATH 142	CRN 17160	CALCULUS 1B	15 PTS	T2
Prerequisites:	MATH 141 or QUAN 111 or PHYS 101 or approved level of achievement in NCEA Level 3 Calculus or an equivalent background in Mathematics			
Integration looks at summing continuous variables, providing a way to define and compute areas and volumes, which are essential for many applications. This course develops integral calculus, including the view of integration as anti-differentiation, leading to the Fundamental Theorem of Calculus. Sequences and series are introduced, and functions are approximated using their Taylor polynomials. Techniques of integration are developed, including substitution and integration by parts. Differential equations are introduced, many of which arise from physical systems, and the course also introduces basic methods for solving them.				

MATH 151	CRN 17161	ALGEBRA	15 PTS	T2
Prerequisites:	(16 Achievement Standard credits NCEA Level 3 Mathematics) or (12 Achievement Standard credits NCEA Level 3 Mathematics excluding the statistics standards 91580, 91581, 91582, 91583, 91584) or MATH 132			
Linear algebra is central to mathematics, and essential in science and engineering. This course introduces linear algebra, motivated by some of these applications, and maintaining a practical approach using fundamental mathematical objects such as matrices and vectors. Methods to solve systems of linear equations using matrices are introduced, as are eigenvectors, which can be used to characterise matrices amongst many other applications. The concept of an algebraic structure is introduced, as are complex numbers, which allow the solution of many equations that did not previously have solutions.				

MATH 161	CRN 17162	DISCRETE MATHEMATICS AND LOGIC	15 PTS	T1
Prerequisites:	Approval of Head of School or (16 Achievement Standard credits NCEA Level 3 Mathematics) or (12 Achievement Standard credits NCEA Level 3 Mathematics excluding the statistics standards 91580, 91581, 91582, 91583, 91584) or MATH 132			
Logic underlies all of mathematics. This course introduces the basic notions of logic and discusses what makes some arguments good or valid, and others invalid. This leads to a definition of a mathematical proof, whereby the truth of mathematical statements is guaranteed. Other topics include sets, relations, functions, elementary counting principles, and an introduction to number theory. The second half of the course introduces the fundamental concepts of graph theory, which is the study of networks, which have applications from computing to disease transmission.				

MATH 177	CRN 19803	PROBABILITY AND DECISION MODELLING	15 PTS	T2
Prerequisites:	Approved level of achievement in NCEA Level 3 Calculus or one of (ENGR 121, MATH 141, QUAN 111) or equivalent background in mathematics.			
Heads or tails? That's fair, right? Is the coin fair though - and how could you check? How might you choose in a more complicated situation? This course gives you an introduction to probability models in Statistics and their use in good decision making. Concepts you will study include probability, random variables and their distributions, decision theory, model estimation using sampled data, and tests for checking fitted models. Bad decisions follow from badly-fitting models. This course is needed for a mathematical pathway in Statistics, and for Actuarial Science. To make good decisions using probability, choose this course!				

STAT 193	(SEE STREAMS)	STATISTICS IN PRACTICE	15 PTS	T1 T2 T3
Restrictions:	MATH 277, QUAN 102			
Streams:	Stream A (CRN 1791), Stream B (CRN 11333)			T1
	Stream A (CRN 4442), Stream B (CRN 6164)			T2
	Steam A (CRN 17069)			T3
An applied statistics course for students who will be advancing in other disciplines as well as those majoring in Statistics. It is particularly suitable for students majoring in Biological Science subjects, Geography, Health, Linguistics, Psychology, social sciences such as Education, and if you are a BCom student. This course assumes no previous knowledge of statistics, but mathematics to Year 12 is preferred. Topics we will cover include data display and inference, estimation, confidence intervals and hypothesis testing, comparison of means, linear regression and correlation, and analysis of variance.				

200-LEVEL COURSES

ACTS 201	CRN 29082	FINANCIAL MATHEMATICS	15 PTS	T1
Prerequisites:	QUAN 102 (or STAT 193 or MATH 177), QUAN 111 (or MATH 141, 142, 151)			
Mathematical principles of compound interest, geometric series and annuities; valuation of loans; returns on financial transactions; duration and immunisation theory; term structure of interest rates; stochastic interest rates.				

AIML 231	CRN 35049	TECHNIQUES IN MACHINE LEARNING	15 PTS	T1
Prerequisites:	One of (AIML 131, MATH 177, QUAN 102, STAT 193) or 60 200-level points of COMP, CGRA, CYBR, SWEN, EEEN; one of (COMP 103, COMP 132)			
Restrictions:	AIML 320, COMP 307, 309, DATA 302			
This course introduces core concepts and techniques in machine learning, as well as commonly used software libraries for implementing machine learning pipelines. It includes an overview of the machine learning field, including supervised and unsupervised learning; fundamental machine learning techniques including neural networks; tools to understand data such as exploratory data analysis, pre-processing, and visualisation; and the design machine learning pipelines. This course balances theoretical concepts of machine learning and the use of programming libraries for hands-on practice.				

DATA 201	CRN 31057	TECHNIQUES OF DATA SCIENCE	15 PTS	T2
Prerequisites:	(DATA 101 or SPCE 201), one of (COMP 102, 112, 132, INFO 102 (or 151)), one of (ENGR 123, MATH 177, PHYS 245, QUAN 102, SPCE 245, STAT 193)			
Discover the essential computational techniques at the heart of data science, encompassing the realms of data integration and encryption. Dive into the mathematical concepts and techniques that underpin the entire data lifecycle, from generation and representation to transformation.				
NOT OFFERED IN 2026				

DATA 202	CRN 31058	DATA MANAGEMENT AND PROGRAMMING	15 PTS	T2
Prerequisites:	One of (COMP 102, 112, 132, INFO 102)			
Explore the practical side of data management in this course designed for those working with data sources. You will get hands-on experience in programming and data management using a high-level language and SQL. You will build confidence in skills such as web scraping, data transformation, data cleaning, and the creation of data summaries and visualisations.				

ENGR 222	CRN 33042	COMPUTATIONAL ALGEBRA AND CALCULUS	15 PTS	T1
Prerequisites:	(ENGR 121, 122) or (MATH 142, 151)			
This course covers fundamental concepts in linear algebra and multivariable calculus, with an emphasis on their applications to physical and engineering problems. Topics covered include linear transformations, matrix decomposition including the singular value decomposition, Taylor series, calculus of vector-valued functions, multivariate functions and vector fields. Mathematical software will be used extensively.				

MATH 212	CRN 31091	INTRODUCTION TO REAL ANALYSIS	15 PTS	T1
Prerequisites:	MATH 142 or B+ in ENGR 122			
The theoretical underpinnings of calculus took many years to develop rigorously. This course provides insight into the basic techniques of real analysis in the familiar context of single-variable differential calculus. There is a focus on the proof techniques that have been developed to analyse classical analytic functions.				

MATH 243	CRN 18323	MULTIVARIABLE CALCULUS	15 PTS	T2
Prerequisites:	(MATH 142, 151) or B+ in ENGR 122			
In order to apply calculus to many physical systems, its concepts have to be extended to higher dimensions. The course introduces vector-valued functions of one variable (curves in the plane and in space), real-valued functions of several variables, and vector fields, which are vector-valued functions of two or three variables. Integration over lines and surfaces, together with double and triple integrals, are defined, together with methods to solve them. Applications are used to motivate and demonstrate these methods.				

MATH 244	CRN 18324	ORDINARY DIFFERENTIAL EQUATIONS	15 PTS	T1
Prerequisites:	(MATH 142, 151) or (ENGR 121,122)			
Ordinary Differential Equations (ODEs) have motivated a lot of mathematics, both for themselves and for their applications, particularly in the wider sciences. This course introduces ODEs, covering their classification, and various solution methods for both linear and nonlinear equations. Systems of ODEs are introduced, together with the linear algebra needed to solve them. The course also presents the Laplace transform and its use in solving ODEs.				

MATH 245	CRN 30099	COMPUTATIONAL MATHEMATICS	15 PTS	T2
Prerequisites:	ENGR 122 or ENGR 123 or (MATH 151 and (141 or 142))			
Combining mathematics with computational techniques allows us to study a wide variety of applications in science, for example, solving physics problems by approximating integrals and derivatives, and compressing digital images using singular-value decomposition. This course develops mathematical, numerical, and computational techniques for practical problems that utilise optimisation, simulation, interpolation, and approximation. Some previous experience in programming is highly desirable.				

MATH 251	CRN 18325	LINEAR ALGEBRA	15 PTS	T2
Prerequisites:	MATH 151 or B+ in ENGR 122			
Linear algebra is a fundamental part of mathematics. This is a second course in linear algebra, focusing on more abstract representations and giving an axiomatic treatment of vector spaces. The course introduces the underlying concepts of linear algebra, including linear transformations, subspaces, isomorphisms, dimensions, eigenvectors, inner products, and diagonalisation. Applications are used to motivate and demonstrate these concepts.				

MATH 261	CRN 18326	GROUPS AND GRAPHS	15 PTS	T1
Prerequisites:	MATH 161 or B+ in ENGR 123			
This course explores two fundamental mathematical structures: groups and graphs. Both have wide applications in mathematics, as well as in fields such as computer science, cryptography, physics, and chemistry. The course starts with basic group theory and explores permutations, matrices, and symmetries. The graph section uses an algorithmic lens to investigate graph complexity, study network flows, construct shortest paths, and find matchings in graphs.				

MATH 277	CRN 19804	MATHEMATICAL STATISTICS	15 PTS	T1
Prerequisites:	(MATH 142, 177) or B+ in both (ENGR 122, 123)			

How likely is a major disaster, and what would the costs be if one occurred? More generally, how can you correctly price insurance for different risks? How should government benefits be set to maximise the long-run wellbeing of a country? To answer these questions needs a good understanding of the probabilities of joint events and how to model them, plus how to predict events while incorporating uncertainty. Here we introduce basic concepts and techniques of probability and statistics, together with an explanation of the logical principles and mathematical tools on which they are based. We use the statistical software R.

STAT 292	CRN 18331	APPLIED STATISTICS	15 PTS	T1
Prerequisites:	STAT 193 or one of (ENGR 123, QUAN 102) or a comparable background in Statistics			

Modern science is heavily data-driven, and statistical methods are instrumental in producing evidence-based conclusions. This course covers applied statistical methods that are widely used across the biological, social and physical sciences. You will examine chi-square tests, t-tests, analysis of variance and non-parametric tests as a means to assess the evidence for differences between groups; and you will fit linear regression, logistic regression, and loglinear models to explore relationships between variables. Relevant examples are used throughout to illustrate the statistical methods considered. The statistical computing package R is used and demonstrated, although no previous programming experience is required.

STAT 293	CRN 18332	APPLIED STATISTICAL MODELLING	15 PTS	T2
Prerequisites:	STAT 292			

What is the strongest predictor of a student's exam performance? What does household medical expenditure depend on? Can we predict the number of bird or plant species on an island based on its environmental features? You can explore questions like these using the statistical modelling techniques in this course. With an emphasis on practical applications, we cover statistical model fitting methods, use of the R software for model fitting and the interpretation of results. Topics covered include randomised block and nested design ANOVA models, permutation testing, multiple linear regression, models for count data and models for multilevel data.

300-LEVEL COURSES

ACTS 331	CRN TBC	TOPICS IN ACTUARIAL SCIENCE 1		15 PTS	T1
Prerequisites:	ACTS 201, (MATH 277 or QUAN 203)		Restrictions:	ACTS 301	
This course provides the mathematical foundation necessary to model, and price life insurance contracts including mortality, interest and expenses. It also covers reserving for life insurance contracts, long tailed contracts, and models involving frequency and severity distributions.					

ACTS 332	CRN TBC	TOPICS IN ACTUARIAL SCIENCE 2	15 PTS	T2
Prerequisites:	ACTS 201, (MATH 277 or QUAN 203)			
Restrictions:	The pair (ACTS 301 and ACTS 336 prior to 2026)			
This course provides the mathematical foundation necessary to model, and price life insurance contracts with multiple decrements, including profit analysis. It also provides the mathematical foundations of general time series analysis and mortality projection.				

ACTS 336	CRN 31125	GENERAL INSURANCE TECHNIQUES	15 PTS	T2
Prerequisites:	MATH 277 (or QUAN 203)			
This course provides the mathematical foundation necessary to set premiums and reserves for general insurance contracts. It provides an overview of the various techniques used in general insurance, including loss distributions, credibility, and general insurance modelling.				

DATA 301	CRN 32011	DATA SCIENCE IN PRACTICE	15 PTS	T2
Prerequisites:	One of (AIML 231, DATA 201), DATA 202, DATA 303			
Take your data science skills to the next level with our capstone course. Dive into interactive displays, infographics, and dashboards to sharpen your communication and reporting abilities through visualisation. This course seamlessly combines statistical and mathematical modelling with programming, while also exploring the social and ethical aspects of data science.				

DATA 303	CRN 32012	STATISTICS FOR DATA SCIENCE	15 PTS	T1
Prerequisites:	DATA 202 or STAT 293; one of (MATH 277, QUAN 203, STAT 292)			
In this course we uncover the role that Statistics plays in Data Science. With a focus on understanding relevant statistical methods and their practical applications, this course will help you consolidate key data science skills. Topics covered include generalised linear models, polynomial regression, generalised additive models, shrinkage methods and supervised learning methods. The topics are covered in the context of inference and prediction for continuous, count and binary outcomes.				

DATA 304 COMP 312	CRN 32013 CRN 10444	SIMULATION AND STOCHASTIC MODELS	15 PTS	T1
Prerequisites:	One course from (COMP 102, 112, 132, DATA 202); one course from (ENGR 123, MATH 177, 277, STAT 292); 15 further 200-level COMP, DATA, MATH, NWEN, STAT or SWEN points			
Simulation and modelling of stochastic systems, covering examples from Operations Research and Computer Science, including queues, networks and computer systems. Design, analysis and validation of simulation experiments. Previous experience with computer programming is required before starting this course. Co-taught with COMP 312.				
NOT OFFERED IN 2026				

DATA 305	CRN 37116	MACHINE LEARNING FOR DATA SCIENCE	15 PTS	T1
Prerequisites:	AIML 231, DATA 202	Restrictions:	DATA 302	
Data Science uses machine learning methods to fit data and make predictions. In this course you will learn how to explore data in order to identify the appropriate ethical and cultural considerations and select the appropriate tools to analyse the data, develop the theory that underlies those tools, and see a variety of modern machine learning algorithms (such as Large Language Models) that make modern machine learning such a fascinating topic.				

DATA 351	CRN 32015	DATA SCIENCE INTERNSHIP	15 PTS	T2
Prerequisites:	AIML 231 or DATA 201; DATA 202; one of (MATH 277, QUAN 203, STAT 292), 15 further 200-level points all with B+ average. This course is limited entry.			
Students will complete an approved and supervised project in a public, private or non-profit organisation with established data science work stream. This project will enable students to gain professional work experience in the application of data science and to develop teamwork and communication skills in a relevant organisation.				

MATH 301	CRN 3505	PARTIAL DIFFERENTIAL EQUATIONS	15 PTS	T1
Prerequisites:	MATH 243, 244			
This course is an introduction to Partial Differential Equations (PDEs), including those of importance for the natural sciences. The course covers solution methods for linear PDEs, including the use of boundary values and initial values. The course develops Fourier series and Fourier transforms and discusses their use in solving PDEs, and also develops Green's functions.				

MATH 304	CRN 37353	COMPLEX ANALYSIS	15 PTS	T2
Prerequisites:	(MATH 212 or MATH 243), 15 further 200-level MATH points			
Complex analysis extends real analysis to functions of complex variables. This course covers the fundamentals of complex analysis, including the Cauchy-Riemann equations, holomorphic functions, harmonic functions, the Cauchy integral formula, power series, and the residue theorem. Applications include evaluating real integrals, a proof of the fundamental theorem of algebra, and solving 2D problems relating to steady temperature distribution, inviscid fluid flow and electrostatics.				

MATH 309	CRN 7528	MATHEMATICAL LOGIC	15 PTS	T2
Prerequisites:	MATH 161 and 30 points from 200-level MATH			
This course examines symbolic languages, which are a foundational pillar of mathematics as well as the basis of computer science. Their semantics and proof theory are studied, explaining the role of logic in describing mathematical structures and formalising reasoning about them. Topics covered include propositional logic, first-order logic of quantifiers and predicates, and the beginnings of model theory, including completeness and compactness theorems. Some computability theory is covered, culminating in Gödel's incompleteness theorem.				

MATH 311	CRN 9591	ALGEBRA	15 PTS	T1
Prerequisites:	(MATH 251 or 261) and 15 further 200-level MATH points			
The abstraction of algebra to sets with extra structure has led to many important mathematical developments. The basic algebraic structures, groups, rings and fields, are the focus of this course, together with some of their applications, such as solving systems of polynomial equations. There is an emphasis on general concepts, such as subgroups, homomorphisms, and factorization. Some familiarity with groups is expected.				

MATH 318	CRN 31093	HILBERT SPACES	15 PTS	T1
Prerequisites:	MATH 212 and MATH 251			
This course extends the techniques of linear algebra and real analysis so that problems of an intrinsically infinite-dimensional nature can be studied. A Hilbert space is an inner product space with the analytic structure suitable for studying such problems. Hilbert spaces, and linear maps on them, are of interest to both mathematicians and physicists.				

MATH 321	CRN 19910	INTRODUCTION TO APPLIED MATHEMATICS	15 PTS	T2
Prerequisites:	MATH 243 and MATH 244			
Many practical problems can be modelled and analysed using differential equations. This course introduces some fundamental methods for such modelling and analysis. The course begins by developing techniques such as dimensional analysis and perturbation methods, and then applies them to solve problems including reaction kinetics, diffusion, and traffic flow.				

MATH 324	CRN 15668	CODING AND CRYPTOGRAPHY	15 PTS	T2
Prerequisites:	MATH 251			
Encoding messages so that they can be transmitted robustly and efficiently, while being safe from eavesdroppers, is an important part of modern communication. This course starts with modern coding theory, introducing linear codes, coding bounds, perfect codes, and cyclic codes to develop codes that can deal with communication over a noisy channel. Moving on to cryptography, the course covers topics such as classical ciphers, one-way pads, Shannon’s Theorem, public key cryptography, one-way functions, the RSA cryptosystem, key distribution and digital signatures.				

MATH 361	CRN 29085	GRAPH THEORY	15 PTS	T1
Prerequisites:	MATH 161 and 30 points from 200-level MATH			
Graphs provide an abstraction that enables many different systems to be modelled and analysed, from computer networks to disease spread. This course introduces graphs as mathematical objects and covers topics including: connectivity and Menger’s Theorem; colourings and Brooks’ Theorem; topological graph theory and Kuratowski’s Theorem; and Ramsey Theory.				

MATH 377	CRN 19805	PROBABILITY AND RANDOM PROCESSES	15 PTS	T1
Prerequisites:	MATH 243; MATH 277			
The course provides a firmer foundation in probability theory and an introduction to random processes. Main topics: conditional distributions and effects of conditioning; martingales in discrete time; Poisson point processes; birth and death processes; renewal processes.				

STAT 332	CRN 19809	STATISTICAL INFERENCE	15 PTS	T2
Prerequisites:	MATH 243, 277			
This course covers distribution theory; estimation including minimum variance unbiased estimators and sufficiency; hypothesis testing and an introduction to order statistics. The topics of estimation and hypothesis testing met in MATH 277 will be looked at in greater depth. Optimal estimation procedures and tests will be developed.				
NOT OFFERED IN 2026				

STAT 335	CRN 27136	STATISTICAL MODELS FOR ACTUARIAL SCIENCE	15 PTS	T2
Prerequisites:	MATH 277			
This course introduces a range of models used in actuarial science, including Markov chains, Markov processes and transition, survival models and estimation with graduation methods and binomial models for mortality.				

STAT 391	CRN 19810	MATHEMATICAL METHODS FOR APPLIED STATISTICS	15 PTS	T1
Prerequisites:	STAT 292			
Restrictions:	MATH 243, the pair (ENGR 122/MATH 142, 251)			
How should we model data to ensure we have a good understanding of the world? Drawing correct conclusions from well-chosen statistical models needs a range of mathematical techniques. This course shows you the key methods used in the construction and maximisation of likelihoods, the analysis of experimental data and linear models, and an exploration of probability plus several probability distributions. Specific mathematical topics include matrices and their properties, differentiation and optimisation of functions, plus integral calculus. The statistical software R will be used.				

STAT 392	CRN 3048	SAMPLE SURVEYS	15 PTS	T1
Prerequisites:	STAT 193 (or equivalent), 30 approved points from 201-399 level courses			
Restrictions:	STAT 439			
An introduction to practical aspects of survey sampling, including writing a survey proposal, costing, non-sampling errors, rudiments of sampling theory, questionnaire design, fieldwork, basic analytic techniques, and report writing.				
NOT OFFERED IN 2026				

STAT 393	CRN 19811	LINEAR MODELS	15 PTS	T2
Prerequisites:	(MATH 243, 277) or (STAT 293, 391)			
This course will cover general linear models: theory and applications, including maximum likelihood estimation, model selection, AIC, tests of hypotheses, confidence intervals, and residual diagnostics. It includes longitudinal analysis for continuous responses using fixed or random effects methods. The course covers the theory of generalised linear models and gives examples for binary and count data. The statistical software R will be used.				

STAT 394	CRN 19808	MULTIVARIATE STATISTICS	15 PTS	T2
Prerequisites:	MATH 277 or (STAT 292, 391)			

Multivariate Statistics is an essential component of Statistics and Data. We'll delve into the fundamental concepts and techniques to tackle complex multivariate data with Principal Component Analysis (simplify data while retaining its integrity), Cluster Analysis (identify patterns and groupings), Factor Analysis (discover the underlying factors influencing your data variables), Discriminant Analysis (learn how to classify), Canonical Correlations (gain insights into the relationships between multiple sets of variables), the Multivariate General Linear Model (make predictions with confidence), and Multidimensional Scaling (discover and visualize complex data relationships). You'll have hands-on experience using statistical software to apply these techniques to real-world datasets.

STAT 395	CRN TBC	DESIGN AND ANALYSIS OF STATISTICAL STUDIES	15 PTS	T1
Prerequisites:	MATH 277 or QUAN 201 or QUAN 203 or STAT 292			
Restrictions:	STAT 455			

An introduction to the ideas and methods required to prepare for and design a statistical study. This includes an introduction to statistical inference. Common study designs will be introduced and sampling methods discussed. Students will learn the principles and practice of sample survey design and inference. Finally, the communication of statistical concepts and data visualization will be covered as this is often required in developing study proposals, reporting results, or working alongside colleagues with different technical backgrounds. The statistical software R will be used.

CONTACT INFORMATION

SCHOOL OF MATHEMATICS AND STATISTICS

Te Kura Mātai Tatauranga

Location:	CO358, Level 3, Cotton Building, Kelburn Campus
Phone:	04-463 5341
Email:	sms-office@vuw.ac.nz
Website:	www.wgtn.ac.nz/sms

STAFF (All room numbers refer to Cotton Building) **ROOM**

Head of School	Prof Richard Arnold	538
Deputy Head of School	Prof Stephen Marsland	443
School Manager	Hariaty Abu Hassan	323

Programme Directors:		
Mathematics	Dr Steven Archer	323
Statistics and Data Science	Dr Yuan Yao	533

Office Administration		
Senior Administrator	Sonia Tenreiro	358
Administrator	Amy Blair	358
Postgraduate Coordinator	Aloisa Cranston	358
Tutor Coordinator	Aisha Ajmal	

TEACHING STAFF	**ROLE / RESEARCH INTERESTS**	**ROOM**
Dr Ryan Admiraal	Social network analysis, disease modelling	536
Prof Astrid an Huef	Functional analysis, operator algebras	439
Dr Steven Archer	Lecturer (Teaching)	323
Dr Becky Armstrong	Post Doctoral Fellow in Mathematics	364
Prof Richard Arnold	Bayesian statistics, reliability, directional statistics, model-based clustering	538
Dr Nick Brettell	Matroid theory, Graph theory, Algorithms and computational complexity	427
David Cox	Lecturer (Teaching)	320
Dr Byoung Du Kim	Number theory	434
Prof Alejandro Frery	Statistical Computing; Signal, Image, and Network Analysis; Data Analysis; Synthetic Aperture Radar (SAR) imagery	537
Dr Emma Greenbank	Mathematical modelling, fluid dynamics, Surtseyan ejecta and Lithium-ion batteries	435

Prof Noam Greenberg	Computability theory, reverse mathematics, algorithmic randomness, higher recursion theory, effective descriptive set theory	438
Dr Tanya Gvozdeva	Lecturer (Teaching)	362
Dr Brendan Harding	Fluid mechanics, differential equations, high performance computing, numerical analysis, fractal geometry	433
Dr John Haywood	Time series analysis, seasonal modelling, forecasting and statistical applications, particularly in ecology	541
Dr David Huijser	Bayesian inference and Markov Chain Monte Carlo (MCMC) methods; statistical modeling in astronomy, volcanology, and neuroscience.	542
Prof Ivy Liu	Categorical data analysis, model-based clustering, analysis of ordinal data	424
Prof Stephen Marsland	Bioacoustics and mathematical ecology, evolutionary game theory, infinite-dimensional geometry.	443
Dr Louise McMillan	Model-based clustering, categorical data analysis, statistical ecology, statistics for population genetics	429
A/Prof Sasha Melnikov	Mathematical logic, computability theory, computable algebraic and metric structures, abelian groups.	442
A/Prof Dimitrios Mitsotakis	Numerical analysis, differential equations, fluid mechanics, nonlinear waves	441
Dr Binh Nguyen	Machine learning, deep learning, health data science and informatics, bioinformatics, drug discovery	535
Prof Lisa Orloff Clark	Functional analysis, operator algebras, associative rings and algebras	324
Dr Hung Le Pham	Banach algebras, abstract harmonic analysis	440
A/Prof Nokuthaba Sibanda	Statistical modelling in fisheries and healthcare, Bayesian inference, Spatial statistics	534
Prof Peter Smith	Probability and statistics applied to communications and signal processing, with a focus on mobile phone/cellular systems	539
Dr Budhi Surya	Optimal stopping of Levy processes, probability applied to financial economics and actuarial science	544
Dr Ilija Tolich	Post Doctoral Fellow in Mathematics	430
Dr Dan Turetsky	Computability theory, algorithmic randomness, descriptive set theory	436
Prof Matt Visser	General relativity, black holes, quantum field theory, theoretical cosmology	321
Dr Yuan Yao	High-dimensional data analysis	533

All room numbers refer to Cotton Building.
Staff email: firstname.lastname@vuw.ac.nz

STUDENT SUPPORT

TĪTOKO—CENTRE FOR STUDENT SUCCESS

The Student Success team offers a range of services that cover all student-related matters from applications and enrolment to graduation. Our aim is to create a client-focused, friendly environment where all who visit our area not only feel welcome, but also receive support and advice of high quality.

Address CO144, Level 1, Cotton Building
Phone 0800 04 04 04

Email: info@vuw.ac.nz Website: www.wgtn.ac.nz/titoko

Email
We encourage you to use email for enquiries, including your full name and ID number in the subject line of your email.

In-person appointments
If you are coming to the office, you will need to make an appointment in advance.

ĀWHINA | MĀORI STUDENT SUPPORT

Āwhina is the on-campus whānau for Māori students to work together to share knowledge, achieve academic success, and build strong communities and leaders.

At Āwhina, our kaupapa (goal) is to help students successfully transition from secondary education or work into tertiary education, and to provide academic support for Māori students enrolled at the University. Our experienced staff offer one-to-one advising and mentoring sessions, tutorials, study wānanga, and a range of workshops to help you achieve your study goals. Our culturally inclusive environment includes whānau rooms with computer facilities, study areas, kitchen facilities, and space to meet with peers or tuākana (older students).

Email: awhina@vuw.ac.nz Website: www.wgtn.ac.nz/awhina

PASIFIKA STUDENT SUCCESS

The Pasifika Student Success team is the University ‘āiga (family) who journey with all Pasifika students at the University. The team fosters learning and teaching communities in an environment that celebrates Pasifika cultures, is welcoming and safe, and is focused on academic excellence, personal growth, and wellbeing.

The Pasifika Student Success team can help you navigate your transition into tertiary study, with study spaces, support staff and mentoring programmes. The team engage with Pasifika students on campus and via various online platforms, such as Zoom, email, phone, and social media.

Email: pasifika@vuw.ac.nz Website: www.wgtn.ac.nz/pasifika