

Honours course list from 2025:

#6 Honours project MATH6010 or MATH6101 or MATH6030

#2 SCIE4000, Research Methods, chosen in semester 1 or 2

#8 chosen from

Semester	CODE	TITLE	Pre-req	Co-req or recommended pre-req	Incompatibles
2	MATH4090	Computation in Financial Mathematics	MATH3090	MATH4091	
1	MATH4091	Financial Calculus	STAT3004	MATH3090	MATH7091
1	MATH4105	General Relativity	(PHYS2100/2101) + (MATH2000/1 or MATH3102)		MATH7105
2	MATH4108	Topics in Mathematical Physics	MATH3401	MATH3103	MATH4104, MATH4106
1	MATH4210	Topics in Applied and Computational Mathematics	MATH2100, MATH2001	MATH2504	MATH4107, MATH4201
1	MATH4306	Topics in Combinatorics	MATH2301, MATH2302		MATH4302, MATH4303, MATH7302, MATH7303
2	MATH4307	Topics in Algebra & Number Theory	MATH3303, MATH3401		MATH4301, MATH4304
2	MATH4407	Advanced Ordinary and Partial Differential Equations	MATH2400/1, MATH2001, MATH2100	MATH3402, MATH3101, MATH3403	MATH4402, MATH4403
1	MATH4408	Measure Theory	MATH2400/1		MATH4405
1,2	MATH6006	Special Topics I			
1,2	MATH6007	Special Topics II			
2	STAT4401	Advanced Statistics	STAT3001		STAT3003, STAT7303, STAT7502
1	STAT4406	Advanced Probability & Stochastic Processes	STAT3004 or STAT7304	STAT3001 or STAT7301	STAT7504, STAT4403, STAT4404

or up to 4 units of other courses at level 3 or higher approved by the associate dean (academic)

MATH4090 - Computation in Financial Mathematics

Introduction to computational methods in finance & applications. Topics from binomial trees, numerical solution of stochastic differential equations, and numerical solution of Black-Scholes like partial differential equations.

MATH4091 - Financial Calculus

Topics from financial calculus including financial derivatives & arbitrage, asset prices, price dynamics, continuous-time hedging, Brownian motion, Martingales, stochastic integration, solving stochastic differential equations & stochastic control.

MATH4105 - General Relativity

Manifolds, tensors, connections & covariant differentiation, parallel transport, geodesics & curvature, differential forms. Foundations of general relativity. Applications to astronomy & cosmology.

MATH4108 - Topics in Mathematical Physics

Mathematical structures and symmetries of physical systems. Illustrative examples may be drawn from classical and quantum many-body systems, integrable and (quasi-)exactly solvable models, conformal field theory, and supersymmetry.

MATH4210 - Topics in Applied and Computational Mathematics

Selected topics in mathematical modelling, scientific computing, perturbation methods, nonlinear dynamics and complex systems.

MATH4306 - Topics in Combinatorics

This course will cover a selection of topics from the areas of combinatorial geometry, graph theory, design theory, and probabilistic combinatorics.

MATH4307 - Topics in Algebra & Number Theory

This course covers advanced topics in algebra and number theory, building on third year courses such as abstract algebra and complex analysis. This course will be crucial for those doing Honours study in pure mathematics, especially those interested in algebra and number theory.

MATH4407 - Advanced Ordinary and Partial Differential Equations

Analysis of partial differential equations (Sobolev spaces, existence and regularity of solutions), selected topics in ordinary differential equations (periodic solutions, Poincare-Bendixson theorem, Floquet's theorem).

MATH4408 – Measure Theory

The course is an introduction to modern measure theory. A sound knowledge of measure theory and the Lebesgue integral is a starting point to undertake advanced studies in partial differential equations, nonlinear analysis, the calculus of variations and probability theory. The aim of this course is to learn basic elements of measure theory, including key methods and examples.

MATH6006 - Special Topics I

Advanced mathematics topics, not covered in other courses, and available only under special circumstances (for example, course to be given by a visiting lecturer in a specialty area that is not usually available). Endorsement of Head, Mathematics required for enrolment.

MATH6007 - Special Topics II

Advanced mathematics topics, not covered in other courses, and available only under special circumstances (for example, course to be given by a visiting lecturer in a specialty area that is not usually available). Endorsement of Head, Mathematics required for enrolment.

STAT4401 – Advanced Statistics

The course focuses on the mathematical understanding of machine learning and data science. Topics to be covered in the first half include theoretical frameworks for supervised learning, unsupervised learning, and Bayesian analysis, Akaike and Bayesian Information criteria, tradeoffs in statistical learning, Monte Carlo methods, and principal component analysis. The second half will include the theory of regularization and kernel methods, Gaussian process regression and support vector machines.

STAT4406 - Advanced Probability & Stochastic Processes

State of the art in advanced probability and stochastic processes. The syllabus consists of a set of core topics of broad relevance in the field, and more specialized topics that depend on the research interest of the lecturer. The core topics cover rigorous measure-theoretic treatments of fundamental concepts, and advanced tools including martingales, limit theorems, advanced stochastic processes.