

Honours course list from 2022

#6 project MATH6010, MATH6020, MATH6030

#10 chosen from

| Semester | CODE | TITLE | Pre-req | Co-req or recommended pre-req | Incompatibles |
|----------|----------|--|--------------------------------|-------------------------------|------------------------------|
| 2 | MATH4090 | Computation in Financial Mathematics | MATH3090 | MATH4091 | MATH7049 |
| 1 | MATH4091 | Financial Calculus | STAT3004 | MATH3090 | |
| 1 | MATH4105 | General Relativity | PHYS2100, MATH2001 | | 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 |
| 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 | | MATH4404, MATH4405 |
| | MATH6006 | Special Topics I | | | |
| | MATH6007 | Special Topics II | | | |
| 2 | STAT4401 | Advanced Statistics | STAT3001 | | STAT3003, STAT7303, STAT7502 |
| 1 | STAT4406 | Advanced Probability & Stochastic Processes | STAT3004 | STAT3001 | 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

Understanding of statistical significance with focus on the use of P-values, the false discovery rate, and multiple comparisons. Analysis of completely random design, block designs, mixed models, and variance components. Basic concepts of sampling introduced, including simple random sampling and strata sampling.

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.