# MC-SCIMAT Master of Science (Mathematics and Statistics)

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| **Year and Campus:** | 2011 - Parkville |
| **CRICOS Code:** | 062189B |
| **Fees Information:** | Subject EFTSL, Level, Discipline & Census Date, http://enrolment.unimelb.edu.au/fees |
| **Level:** | Graduate/Postgraduate |
| **Duration & Credit Points:** | 200 credit points taken over 24 months full time. This course is available as full or part time. |
| **Coordinator:** | Dr Paul Norbury |
| **Contact:** | Melbourne Graduate School of Science<br>Faculty of Science<br>The University of Melbourne<br>Victoria 3010<br><br>Tel: + 61 3 8344 6128<br>Fax: +61 3 8344 3351<br><br>Web: **http://graduate.science.unimelb.edu.au/ (http://graduate.science.unimelb.edu.au/)** |
| **Course Overview:** | The Master of Science - Mathematics and Statistics is one of the research training streams of the Master of Science. The research training streams give students the opportunity to undertake a substantive research project in a field of choice as well as a broad range of coursework subjects including a professional tools component, as a pathway to PhD study or to the workforce. |
| **Objectives:** | After completing this course students should have:<br># discovered the challenge of research in Mathematics and Statistics;<br># a deeper knowledge of Mathematics and Statistics;<br># completed a substantial piece of research; and<br># a sound preparation for future research in Mathematics or Statistics. |
| **Course Structure & Available Subjects:** | Note: the information below applies to students who commence in 2011 or beyond. Students who commenced prior to 2011 should refer to the Handbook entry of their year of commencement for information in regards to course structure.<br><br>Students must complete a total of 200 points over the two year full-time (or four year part-time) program, comprising:<br><br>• Discipline Subjects: 137.5 points<br>• Professional Tools Subject: 12.5 points<br>• Research Project: 50 points<br><br>**Discipline Subjects (137.5 points)**<br><br>On enrolment, students must select a specialisation from the four listed below:<br>• Applied Mathematics and Mathematics Physics<br>• Discrete Mathematics and Operations Research<br>• Pure Mathematics<br>• Statistics and Stochastic Processes<br><br>Students must complete 11 x 12.5 point subjects as indicated below:-<br><br>Two x 25 points:<br><br>Compulsory subjects from the student's selected specialisation<br><br>Three x 37.5 points:<br><br>Elective subjects from the student's selected specialisation<br><br>Two x 25 points:<br><br>Any subjects from a single specialisation different to the student's selected specialisation<br><br>Four x 50 points: |

Any subjects from any of the specialisations (including up to two approved Masters level subjects from other departments). Up to two of these subjects can be replaced with approved undergraduate subjects. Where it is necessary for the student to acquire the required knowledge for Masters level Mathematics & Statistics discipline subjects, up to two further Masters level subjects can be replaced with approved undergraduate subjects.

Some of the discipline subjects listed below are offered each year, but others are offered in alternate years. Subjects offered in odd years are labelled with (o), the ones offered in even years are labelled with (e).

### Applied Mathematics and Mathematics Physics

Compulsory Subjects
• MAST90064 Advanced Methods: Differential Equations (o)
• MAST90067 Advanced Methods: Transforms (e)

Elective subjects
• MAST90026 (620-637) Computational Differential Equations (e)
• MAST90066 Continuum Mechanics and Applications (o)
• MAST90011 Modelling: Mathematical Biology (e)
• MAST90060 Mathematical Statistical Mechanics (o)
• MAST90065 Exactly Solvable Models (o)
• MAST90069 Introduction to String Theory (e)

### Discrete Mathematics and Operations Research

Compulsory Subjects
• MAST90030 (620-646) Advanced Discrete Mathematics
• MAST90014 (620-616) Optimisation for Industry

Elective subjects
• MAST90013 (620-615) Network Optimisation (o)
• MAST90050 (620-501) Scheduling and Optimisation (e)
• MAST90031 (620-647) Enumerative Combinatorics (o)
• MAST90053 (620-712) Experimental Mathematics (e)

### Pure Mathematics

Compulsory Subjects
• MAST90012 (620-645) Measure Theory (o)
• MAST90023 (620-634) Algebraic Topology (e)

Elective subjects
• MAST90025 (620-636) Commutative and Multilinear Algebra (e)
• MAST90017 (620-619) Representation Theory (o)
• MAST90068 Groups, Categories & Homological Algebra (e)
• MAST90029 (620-640) Differential Topology and Geometry (o)
• MAST90020 (620-628) Functional Analysis (e)
• MAST90056 (620-715) Riemann Surfaces and Complex Analysis (o)

### Statistics and Stochastic Processes

Compulsory Subjects
• MAST90062 Probability & Mathematical Statistics I
• MAST90063 Probability & Mathematical Statistics II

Elective subjects
• MAST90009 (600-655) Business Forecasting (o)
• MAST90051 (620-502) Mathematics of Risk (e)
• MAST90059 Stochastic Calculus with Applications (o)
• MAST90061 Modern Statistical Methods (o)
• MAST90019 (620-624) Random Processes (e)
• MAST90027 (620-638) The Practice of Statistics (e)

### Professional tools subject (12.5 points)

Students must complete MAST90045 (600-617) Systems Modelling and Simulation. If students have completed the approved equivalent of this subject by way of 620-131 Scientific Programming and Simulation (2007) or another approved equivalent subject, they will be exempt from MAST90045 (600-617) and will be required to complete an additional 12.5 point Masters level discipline Mathematics and Statistics subject in its place.

### Research Project (50 points)

The Research Project is an integral part of the Master of Science (Mathematics and Statistics program) and a thesis is the main requirement for this component.

Students are required to complete a 50 point Research Project. Students may enrol in one or more Research Project subjects as indicated below to ensure they have completed a total of 50 points by the end of their course.

- MAST90042 (620-649) Research Project - 50 points
- MAST90046 (620-650) Research Project - 37.5 points
- MAST90047 (620-651) Research Project - 25.0 points
- MAST90048 (620-652) Research Project - 12.5 points

**Subject Options:**

## Applied Mathematics and Mathematics Physics

| Subject | Study Period Commencement: | Credit Points: |
|---|---|---|
| MAST90064 Advanced Methods: Differential Equations | Semester 1 | 12.50 |
| MAST90067 Advanced Methods: Transforms | Not offered 2011 | 12.50 |
| MAST90026 Computational Differential Equations | Not offered 2011 | 12.50 |
| MAST90066 Continuum Mechanics and Applications | Semester 2 | 12.50 |
| MAST90011 Modelling: Mathematical Biology | Not offered 2011 | 12.50 |
| MAST90060 Mathematical Statistical Mechanics | Semester 1 | 12.50 |
| MAST90065 Exactly Solvable Models | Semester 2 | 12.50 |
| MAST90069 Introduction to String Theory | Not offered 2011 | 12.50 |

## Discrete Mathematics and Operations Research

| Subject | Study Period Commencement: | Credit Points: |
|---|---|---|
| MAST90030 Advanced Discrete Mathematics | Semester 2 | 12.50 |
| MAST90014 Optimisation for Industry | Semester 1 | 12.50 |
| MAST90013 Network Optimisation | Semester 2 | 12.50 |
| MAST90050 Scheduling and Optimisation | Not offered 2011 | 12.50 |
| MAST90031 Enumerative Combinatorics | Semester 1 | 12.50 |
| MAST90053 Experimental Mathematics | Not offered 2011 | 12.50 |

## Pure Mathematics

| Subject | Study Period Commencement: | Credit Points: |
|---|---|---|
| MAST90012 Measure Theory | Semester 1 | 12.50 |
| MAST90023 Algebraic Topology | Not offered 2011 | 12.50 |
| MAST90025 Commutative and Multilinear Algebra | Not offered 2011 | 12.50 |
| MAST90017 Representation Theory | Semester 2 | 12.50 |
| MAST90068 Groups, Categories & Homological Algebra | Not offered 2011 | 12.50 |
| MAST90029 Differential Topology and Geometry | Semester 1 | 12.50 |
| MAST90020 Functional Analysis | Not offered 2011 | 12.50 |
| MAST90056 Riemann Surfaces and Complex Analysis | Semester 2 | 12.50 |

### Statistics and Stochastic Processes

| Subject | Study Period Commencement: | Credit Points: |
|---|---|---|
| MAST90062 Probability & Mathematical Statistics I | Semester 1 | 12.50 |
| MAST90063 Probability & Mathematical Statistics II | Semester 2 | 12.50 |
| MAST90009 Business Forecasting | Semester 2 | 12.50 |
| MAST90051 Mathematics of Risk | Not offered 2011 | 12.50 |
| MAST90059 Stochastic Calculus with Applications | Semester 1 | 12.50 |
| MAST90061 Modern Statistical Methods | Semester 2 | 12.50 |
| MAST90019 Random Processes | Not offered 2011 | 12.50 |
| MAST90027 The Practice of Statistics | Not offered 2011 | 12.50 |

### Professional Tools

| Subject | Study Period Commencement: | Credit Points: |
|---|---|---|
| MAST90045 Systems Modelling and Simulation | Semester 1 | 12.50 |

### Research Project

| Subject | Study Period Commencement: | Credit Points: |
|---|---|---|
| MAST90042 Research Project | Semester 1, Semester 2 | 50 |
| MAST90046 Research Project | Semester 1, Semester 2 | 37.50 |
| MAST90047 Research Project | Semester 1, Semester 2 | 25 |
| MAST90048 Research Project | Semester 1, Semester 2 | 12.50 |

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| **Entry Requirements:** | Bachelor degree with a major in an appropriate discipline with at least an H3 (65%) average in the major or equivalent. |
| **Core Participation Requirements:** | The Master of Science (Mathematics and Statistics) welcomes applications from students with disabilities. It is University and degree policy to take all reasonable steps to minimise the impact of disability upon academic study, and reasonable adjustments will be made to enhance a student's participation in the degree.The Master of Science (Mathematics and Statistics) requires all students to enrol in subjects where they will require: (1) the ability to comprehend complex science and technology related information;(2) the ability to clearly and independently communicate a knowledge and application of science, and technology principles and practices during assessment tasks;(3) the ability to actively and safely contribute in clinical, laboratory, and fieldwork/excursion activities.Students must possess behavioural and social attributes that enable them to participate in a complex learning environment. Students are required to take responsibility for their own participation and learning. They also contribute to the learning of other students in collaborative learning environments, demonstrating interpersonal skills and an understanding of the needs of other students. Assessment may include the outcomes of tasks completed in collaboration with other students.There may be additional inherent academic requirements for some subjects, and these requirements are listed within the description of the requirements for each of these subjects.Students who feel their disability will impact on meeting this requirement are encouraged to discuss this matter with the relevant Subject Coordinator and the Disability Liaison Unit: http://www.services.unimelb.edu.au/disability/ |
| **Further Study:** | The Research Training programs offer a pathway to a PhD. |
| **Graduate Attributes:** | Graduates will: have the ability to demonstrate advanced independent critical enquiry, analysis and reflection; have a strong sense of intellectual integrity and the ethics of scholarship; have in-depth knowledge of their specialist discipline(s); reach a high level of achievement in writing, research or project activities, problem-solving and communication; be critical and creative |

| | thinkers, with an aptitude for continued self-directed learning; be able to examine critically, synthesise and evaluate knowledge across a broad range of disciplines; have a set of flexible and transferable skills for different types of employment; and be able to initiate and implement constructive change in their communities, including professions and workplaces. |
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| **Links to further information:** | http://graduate.science.unimelb.edu.au |