

## MC-SCIPHY Master of Science (Physics)

| <b>Year and Campus:</b>                           | 2015 - Parkville  |                |         |                            |                |                             |            |       |                                |            |       |                              |            |       |                                 |            |       |                              |            |       |                            |            |       |
|---|---|----------------|---------|----------------------------|----------------|-----------------------------|------------|-------|--------------------------------|------------|-------|------------------------------|------------|-------|---------------------------------|------------|-------|------------------------------|------------|-------|----------------------------|------------|-------|
| <b>CRICOS Code:</b>                               | 062189B   |                |         |                            |                |                             |            |       |                                |            |       |                              |            |       |                                 |            |       |                              |            |       |                            |            |       |
| <b>Fees Information:</b>                          | Subject EFTSL, Level, Discipline & Census Date, <a href="http://enrolment.unimelb.edu.au/fees">http://enrolment.unimelb.edu.au/fees</a>   |                |         |                            |                |                             |            |       |                                |            |       |                              |            |       |                                 |            |       |                              |            |       |                            |            |       |
| <b>Level:</b>                                     | Graduate/Postgraduate   |                |         |                            |                |                             |            |       |                                |            |       |                              |            |       |                                 |            |       |                              |            |       |                            |            |       |
| <b>Duration &amp; Credit Points:</b>              | 200 credit points taken over 24 months full time. This course is available as full or part time.  |                |         |                            |                |                             |            |       |                                |            |       |                              |            |       |                                 |            |       |                              |            |       |                            |            |       |
| <b>Coordinator:</b>                               | Assoc Prof Jeff McCallum Email: <a href="mailto:msc@physics.unimelb.edu.au">msc@physics.unimelb.edu.au</a>  |                |         |                            |                |                             |            |       |                                |            |       |                              |            |       |                                 |            |       |                              |            |       |                            |            |       |
| <b>Contact:</b>                                   | <p><b>Melbourne Graduate School of Science</b><br/> Faculty of Science<br/> The University of Melbourne</p> <p>Tel: + 61 3 8344 6128<br/> Fax: +61 3 8344 3351<br/> Web: <a href="http://graduate.science.unimelb.edu.au">http://graduate.science.unimelb.edu.au</a> (<a href="http://graduate.science.unimelb.edu.au/">http://graduate.science.unimelb.edu.au/</a>)</p> <p><b>Future Student Enquiries</b> (<a href="https://enquiry.app.unimelb.edu.au/?cc=MC-SCIPHY&amp;fn=MGSS">https://enquiry.app.unimelb.edu.au/?cc=MC-SCIPHY&amp;fn=MGSS</a>)</p>   |                |         |                            |                |                             |            |       |                                |            |       |                              |            |       |                                 |            |       |                              |            |       |                            |            |       |
| <b>Course Overview:</b>                           | <p>The Master of Science (Physics) is a coursework masters degree incorporating a substantial research project.</p> <p>The Master of Science gives 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 skills component, as a pathway to PhD study or to the workforce.</p>  |                |         |                            |                |                             |            |       |                                |            |       |                              |            |       |                                 |            |       |                              |            |       |                            |            |       |
| <b>Learning Outcomes:</b>                         | <p>At the completion of this course, students should be able to:</p> <ul style="list-style-type: none"> <li># analyse how to solve a problem by applying simple fundamental laws to more complicated situations;</li> <li># apply abstract concepts to real-world situations;</li> <li># manage time effectively in order to be prepared for group discussions and undertake the assignments and examinations.</li> </ul>   |                |         |                            |                |                             |            |       |                                |            |       |                              |            |       |                                 |            |       |                              |            |       |                            |            |       |
| <b>Course Structure &amp; Available Subjects:</b> | <p>The Master of Science - Physics program offers students an exciting array of topics designed to prepare students for a career as a professional physicist and beyond. Students must complete 200 pts comprising:</p> <ul style="list-style-type: none"> <li># Discipline Component subjects (87.5 points);</li> <li># Professional Skills subject (12.5 points);</li> <li># Research Project (100 points).</li> </ul>  |                |         |                            |                |                             |            |       |                                |            |       |                              |            |       |                                 |            |       |                              |            |       |                            |            |       |
| <b>Subject Options:</b>                           | <p><b>Discipline Component</b></p> <p>Students must select seven of the following subjects:</p> <table border="1"> <thead> <tr> <th>Subject</th> <th>Study Period Commencement:</th> <th>Credit Points:</th> </tr> </thead> <tbody> <tr> <td>PHYC90007 Quantum Mechanics</td> <td>Semester 1</td> <td>12.50</td> </tr> <tr> <td>PHYC90008 Quantum Field Theory</td> <td>Semester 1</td> <td>12.50</td> </tr> <tr> <td>PHYC90012 General Relativity</td> <td>Semester 1</td> <td>12.50</td> </tr> <tr> <td>PHYC90010 Statistical Mechanics</td> <td>Semester 1</td> <td>12.50</td> </tr> <tr> <td>PHYC90009 Physical Cosmology</td> <td>Semester 2</td> <td>12.50</td> </tr> <tr> <td>PHYC90011 Particle Physics</td> <td>Semester 2</td> <td>12.50</td> </tr> </tbody> </table> |                | Subject | Study Period Commencement: | Credit Points: | PHYC90007 Quantum Mechanics | Semester 1 | 12.50 | PHYC90008 Quantum Field Theory | Semester 1 | 12.50 | PHYC90012 General Relativity | Semester 1 | 12.50 | PHYC90010 Statistical Mechanics | Semester 1 | 12.50 | PHYC90009 Physical Cosmology | Semester 2 | 12.50 | PHYC90011 Particle Physics | Semester 2 | 12.50 |
| Subject   | Study Period Commencement:  | Credit Points: |         |                            |                |                             |            |       |                                |            |       |                              |            |       |                                 |            |       |                              |            |       |                            |            |       |
| PHYC90007 Quantum Mechanics                       | Semester 1  | 12.50          |         |                            |                |                             |            |       |                                |            |       |                              |            |       |                                 |            |       |                              |            |       |                            |            |       |
| PHYC90008 Quantum Field Theory                    | Semester 1  | 12.50          |         |                            |                |                             |            |       |                                |            |       |                              |            |       |                                 |            |       |                              |            |       |                            |            |       |
| PHYC90012 General Relativity                      | Semester 1  | 12.50          |         |                            |                |                             |            |       |                                |            |       |                              |            |       |                                 |            |       |                              |            |       |                            |            |       |
| PHYC90010 Statistical Mechanics                   | Semester 1  | 12.50          |         |                            |                |                             |            |       |                                |            |       |                              |            |       |                                 |            |       |                              |            |       |                            |            |       |
| PHYC90009 Physical Cosmology                      | Semester 2  | 12.50          |         |                            |                |                             |            |       |                                |            |       |                              |            |       |                                 |            |       |                              |            |       |                            |            |       |
| PHYC90011 Particle Physics                        | Semester 2  | 12.50          |         |                            |                |                             |            |       |                                |            |       |                              |            |       |                                 |            |       |                              |            |       |                            |            |       |

|                                       |            |       |
|---------------------------------------|------------|-------|
| PHYC90013 Condensed Matter Physics    | Semester 2 | 12.50 |
| PHYC90006 Quantum and Advanced Optics | Semester 2 | 12.50 |

\*Students may substitute at most two approved subjects at 300 level or higher. It will be compulsory to take 300-level Statistical Physics or 300-level Electrodynamics if the student did not take these subjects (or their equivalent at another institution) during undergraduate studies. Please contact the Melbourne Graduate School of Science at [graduate-science@unimelb.edu.au](mailto:graduate-science@unimelb.edu.au) (mailto:graduate-science@unimelb.edu.au) for approval.

### Professional Skills

Students must take one of the following subjects:

| Subject  | Study Period Commencement: | Credit Points: |
|--|----------------------------|----------------|
| MAST90044 Thinking and Reasoning with Data         | Semester 1                 | 12.50          |
| MAST90045 Systems Modelling and Simulation         | Semester 1                 | 12.50          |
| SCIE90005 Ethics and Responsibility in Science     | Semester 1                 | 12.50          |
| MAST90007 Statistics for Research Workers          | July                       | 12.50          |
| SCIE90012 Science Communication                    | Not offered 2015           | 12.50          |
| SCIE90013 Communication for Research Scientists    | Semester 1                 | 12.50          |
| BUSA90403 Business Tools: Money People & Processes | September                  | 12.5           |

### Research Project

Students will gain research experience in Physics by completing a 100 point Research Project comprising: a preliminary literature survey and research plan at the end of year one or after the student has enrolled in 25 points of Research Project (10 page limit of mixed text, diagrams and mathematical formulas; pass/fail); an oral presentation at the end of year one or after the student has enrolled in 25 points of Research Project (up to 20 min; pass/fail); a major thesis at the end of year two (50 page limit of mixed text, diagrams and mathematical formulas; 90% of final grade); an oral presentation at the end of year two (up to 30 min; 10% of final grade); and the completion of an advanced seminar in the relevant research area (pass/fail).

The research project will be taken over consecutive semesters (to a maximum of four) and will begin on the Monday of the first semester of research project enrolment (semesters 1 or 2) and continue until the end of the final semester of research project enrolment. The research project work continues over summer and winter breaks, minus recreation leave of 4 weeks per year. For how long and at what time within the enrolment the actual period of leave is to be taken needs to be negotiated with a student's supervisor.

The thesis will be due for submission at the end of the formal examination period of the final semester of research project enrolment (usually fourth semester) if an earlier date is not specified.

Students may enrol in a combination of research project subjects and coursework subjects as long as once the Research Project is commenced, the consecutive enrolment requirement is met and to ensure they have completed a total of 100 points for the research project by the end of their course.

You must consult your supervisor to discuss an appropriate study plan prior to enrolling in your subjects online through the Student Portal. In particular, it is important that you agree an appropriate combination of research project points and coursework point enrolment each semester.

| Subject                    | Study Period Commencement: | Credit Points: |
|----------------------------|----------------------------|----------------|
| PHYC90024 Research Project | Semester 1, Semester 2     | 12.50          |
| PHYC90023 Research Project | Semester 1, Semester 2     | 25             |
| PHYC90022 Research Project | Semester 1, Semester 2     | 37.50          |

|   |  |                        |    |
|---|--|------------------------|----|
|   | PHYC90021 Research Project   | Semester 1, Semester 2 | 50 |
| <b>Entry Requirements:</b>              | <p><b>In order to be considered for entry, applicants must have completed:</b></p> <ul style="list-style-type: none"> <li>• an undergraduate degree in a discipline appropriate to the stream of the Master of Science into which entry is sought, with a weighted average mark of at least H3 (65%) in the best 50 points in appropriate discipline studies at third year; and</li> <li>• appropriate prerequisite studies for the stream into which entry is sought</li> </ul> <p>For stream specific requirements please <b>click here</b> (<a href="http://science.unimelb.edu.au/available-stream-requirements%20">http://science.unimelb.edu.au/available-stream-requirements%20</a>) .</p> <p>-</p> <p>Meeting these requirements does not guarantee selection.</p> <p>In ranking applications, the Selection Committee will consider prior academic performance.</p> <p>The Selection Committee may seek further information to clarify any aspect of an application in accordance with the <b>Admission and Selection into Course Policy</b> (<a href="http://policy.unimelb.edu.au/MPF1035">http://policy.unimelb.edu.au/MPF1035</a>) .</p> <p>Applicants are required to satisfy the university's <b>English language requirements for postgraduate courses</b> (<a href="http://www.policy.unimelb.edu.au/schedules/MPF1035-ScheduleA.pdf">http://www.policy.unimelb.edu.au/schedules/MPF1035-ScheduleA.pdf</a>) . For those applicants seeking to meet these requirements by one of the standard tests approved by the Academic Board, performance band 6.5 is required.</p> <p>-</p> <p><b>Notes:</b></p> <ul style="list-style-type: none"> <li>• Quotas may be applied to the degree as a whole, or to an individual stream, and preference may be given to applicants with evidence of appropriate preparation or potential to undertake research.</li> <li>• Entry into a stream of the Master of Science is subject to the capacity of the department(s) or schools(s) offering the program stream to provide adequate supervision in a research project appropriate to the interests and preparation of the individual student and may be subject to the agreement of a member of academic staff to supervise the project module.</li> </ul> |                        |    |
| <b>Core Participation Requirements:</b> | It is University policy to take all reasonable steps to minimise the impact of disability upon academic study and reasonable steps will be made to enhance a student's participation in the University's programs. Students who feel their disability may impact upon their active and safe participation in a subject are encouraged to discuss this with the relevant subject coordinator and the Disability Liaison Unit.   |                        |    |
| <b>Further Study:</b>                   | The Master of Science offers a pathway to a PhD.   |                        |    |
| <b>Graduate Attributes:</b>             | 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.   |                        |    |
| <b>Links to further information:</b>    | <a href="http://graduate.science.unimelb.edu.au/programs/msc/physics">http://graduate.science.unimelb.edu.au/programs/msc/physics</a>  |                        |    |