

# MAST20022 Group Theory and Linear Algebra

<b>Credit Points:</b>	12.5																								
<b>Level:</b>	2 (Undergraduate)																								
<b>Dates &amp; Locations:</b>	2016, Parkville This subject commences in the following study period/s: Semester 2, Parkville - Taught on campus.																								
<b>Time Commitment:</b>	Contact Hours: 3 x one hour lectures per week, 1 x one hour practice class per week Total Time Commitment: Estimated total time commitment of 170 hours																								
<b>Prerequisites:</b>	<p>One of</p> <table border="1"> <thead> <tr> <th>Subject</th> <th>Study Period Commencement:</th> <th>Credit Points:</th> </tr> </thead> <tbody> <tr> <td>MAST10008 Accelerated Mathematics 1</td> <td>Semester 1</td> <td>12.50</td> </tr> <tr> <td colspan="3"># MAST10013 UMEP Maths for High Achieving Students</td> </tr> </tbody> </table> <p>Or</p> <table border="1"> <thead> <tr> <th>Subject</th> <th>Study Period Commencement:</th> <th>Credit Points:</th> </tr> </thead> <tbody> <tr> <td>MAST10007 Linear Algebra</td> <td>Summer Term, Semester 1, Semester 2</td> <td>12.50</td> </tr> </tbody> </table> <p>and one of</p> <table border="1"> <thead> <tr> <th>Subject</th> <th>Study Period Commencement:</th> <th>Credit Points:</th> </tr> </thead> <tbody> <tr> <td>MAST20026 Real Analysis</td> <td>Semester 1, Semester 2</td> <td>12.50</td> </tr> <tr> <td>MAST10009 Accelerated Mathematics 2</td> <td>Semester 2</td> <td>12.50</td> </tr> </tbody> </table>	Subject	Study Period Commencement:	Credit Points:	MAST10008 Accelerated Mathematics 1	Semester 1	12.50	# MAST10013 UMEP Maths for High Achieving Students			Subject	Study Period Commencement:	Credit Points:	MAST10007 Linear Algebra	Summer Term, Semester 1, Semester 2	12.50	Subject	Study Period Commencement:	Credit Points:	MAST20026 Real Analysis	Semester 1, Semester 2	12.50	MAST10009 Accelerated Mathematics 2	Semester 2	12.50
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MAST10007 Linear Algebra	Summer Term, Semester 1, Semester 2	12.50																							
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MAST20026 Real Analysis	Semester 1, Semester 2	12.50																							
MAST10009 Accelerated Mathematics 2	Semester 2	12.50																							
<b>Corequisites:</b>	None																								
<b>Recommended Background Knowledge:</b>	None																								
<b>Non Allowed Subjects:</b>	None																								
<b>Core Participation Requirements:</b>	For the purposes of considering request for Reasonable Adjustments under the Disability Standards for Education (Cwth 2005), and Students Experiencing Academic Disadvantage Policy, academic requirements for this subject are articulated in the Subject Description, Subject Objectives, Generic Skills and Assessment Requirements of this entry. The University is dedicated to provide support to those with special requirements. Further details on the disability support scheme can be found at the Disability Liaison Unit website: <a href="http://www.services.unimelb.edu.au/disability/">http://www.services.unimelb.edu.au/disability/</a>																								
<b>Coordinator:</b>	Dr Alexandru Ghitza																								
<b>Contact:</b>	Second Year Coordinator <b>Email: <a href="mailto:sycoord@ms.unimelb.edu.au">sycoord@ms.unimelb.edu.au</a> (mailto:sycoord@ms.unimelb.edu.au)</b>																								
<b>Subject Overview:</b>	This subject introduces the theory of groups, which is at the core of modern algebra, and which has applications in many parts of mathematics, chemistry, computer science and theoretical physics. It also develops the theory of linear algebra, building on material in earlier subjects																								

	<p>and providing both a basis for later mathematics studies and an introduction to topics that have important applications in science and technology.</p> <p>Topics include: modular arithmetic and RSA cryptography; abstract groups, homomorphisms, normal subgroups, quotient groups, group actions, symmetry groups, permutation groups and matrix groups; theory of general vector spaces, inner products, linear transformations, spectral theorem for normal matrices, Jordan normal form.</p>
<b>Learning Outcomes:</b>	<p>On completion of this subject, students should</p> <p>Understand the concepts of:</p> <ul style="list-style-type: none"> <li># abstract groups, homomorphisms and quotient groups;</li> <li># abstract vector spaces, inner product spaces and linear transformations;</li> </ul> <p>Be able to:</p> <ul style="list-style-type: none"> <li># do calculations in modular arithmetic and apply these to RSA cryptography;</li> <li># find eigenvalues, eigenvectors, minimal polynomials and normal forms for linear transformations;</li> <li># analyse groups of permutations, symmetries, and matrices;</li> <li># prove simple results in group theory and linear algebra.</li> </ul>
<b>Assessment:</b>	Three written assignments due at regular intervals during semester amounting to a total of up to 50 pages (20%), and a 3-hour written examination in the examination period (80%).
<b>Prescribed Texts:</b>	Lecture Notes for Group Theory and Linear Algebra, Department of Mathematics and Statistics.
<b>Breadth Options:</b>	<p>This subject potentially can be taken as a breadth subject component for the following courses:</p> <ul style="list-style-type: none"> <li># <b>Bachelor of Arts</b> (<a href="https://handbook.unimelb.edu.au/view/2016/B-ARTS">https://handbook.unimelb.edu.au/view/2016/B-ARTS</a>)</li> <li># <b>Bachelor of Commerce</b> (<a href="https://handbook.unimelb.edu.au/view/2016/B-COM">https://handbook.unimelb.edu.au/view/2016/B-COM</a>)</li> <li># <b>Bachelor of Environments</b> (<a href="https://handbook.unimelb.edu.au/view/2016/B-ENVS">https://handbook.unimelb.edu.au/view/2016/B-ENVS</a>)</li> <li># <b>Bachelor of Music</b> (<a href="https://handbook.unimelb.edu.au/view/2016/B-MUS">https://handbook.unimelb.edu.au/view/2016/B-MUS</a>)</li> </ul> <p>You should visit <b>learn more about breadth subjects</b> (<a href="http://breadth.unimelb.edu.au/breadth/info/index.html">http://breadth.unimelb.edu.au/breadth/info/index.html</a>) and read the breadth requirements for your degree, and should discuss your choice with your student adviser, before deciding on your subjects.</p>
<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>Generic Skills:</b>	<p>In addition to learning specific skills that will assist students in their future careers in science, they will have the opportunity to develop generic skills that will assist them in any future career path. These include</p> <ul style="list-style-type: none"> <li># problem-solving skills: the ability to engage with unfamiliar problems and identify relevant solution strategies;</li> <li># analytical skills: the ability to construct and express logical arguments and to work in abstract or general terms to increase the clarity and efficiency of analysis;</li> <li># collaborative skills: the ability to work in a team;</li> <li># time management skills: the ability to meet regular deadlines while balancing competing commitments</li> </ul>
<b>Notes:</b>	This subject is available for science credit to students enrolled in the BSc (both pre-2008 and new degrees), BAsC or a combined BSc course.
<b>Related Majors/Minors/Specialisations:</b>	<p>Pure Mathematics          Pure Mathematics          Science-credited subjects - new generation B-SCI and B-ENG.          Selective subjects for B-BMED</p>
<b>Related Breadth Track(s):</b>	Accelerated Mathematics