

## MAST20022 Group Theory and Linear Algebra

<b>Credit Points:</b>	12.50
<b>Level:</b>	2 (Undergraduate)
<b>Dates &amp; Locations:</b>	2010, Parkville This subject commences in the following study period/s: Semester 2, Parkville - Taught on campus. Lectures and practice classes
<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 120 hours
<b>Prerequisites:</b>	One of <ul style="list-style-type: none"> <li># <b>620-157 Accelerated Mathematics 1 (/view/2010/620-157)</b></li> <li># 620-122 Mathematics B Advanced (prior to 2008)</li> <li># 620-190 UMEP Maths for High Achieving Students</li> <li># 620-194 Mathematics B Advanced (prior to 2006)</li> <li># 620-211 Mathematics 2 Advanced (prior to 2008)</li> </ul> <b>Or</b> A grade of H1 in either of the following with additional reading <ul style="list-style-type: none"> <li># 620-142 Mathematics B (prior to 2009)</li> <li># 620-192 Mathematics B (prior to 2006)</li> </ul> <b>Or</b> <b>620-156 Linear Algebra (/view/2010/620-156)</b> and one of <ul style="list-style-type: none"> <li># <b>620-295 Real Analysis with Applications (/view/2010/620-295)</b></li> <li># <b>620-158 Accelerated Mathematics 2 (/view/2010/620-158)</b></li> <li># 620-121 Mathematics A Advanced (prior to 2008)</li> <li># 620-120 UMEP Maths for High Achieving Students (prior to 2008)</li> </ul>
<b>Corequisites:</b>	None
<b>Recommended Background Knowledge:</b>	None
<b>Non Allowed Subjects:</b>	Students may only gain credit for one of <ul style="list-style-type: none"> <li># 620-297 Group Theory and Linear Algebra</li> <li># 620-222 Linear and Abstract Algebra (prior to 2009).</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 participation are encouraged to discuss this with the subject coordinator and the Disability Liaison Unit.
<b>Coordinator:</b>	Assoc Prof Craig Hodgson
<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 and providing both a basis for later mathematics studies and an introduction to topics that have important applications in science and technology.

	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.
<b>Objectives:</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/2010/B-ARTS">https://handbook.unimelb.edu.au/view/2010/B-ARTS</a>)</li> <li># <b>Bachelor of Commerce</b> (<a href="https://handbook.unimelb.edu.au/view/2010/B-COM">https://handbook.unimelb.edu.au/view/2010/B-COM</a>)</li> <li># <b>Bachelor of Environments</b> (<a href="https://handbook.unimelb.edu.au/view/2010/B-ENVS">https://handbook.unimelb.edu.au/view/2010/B-ENVS</a>)</li> <li># <b>Bachelor of Music</b> (<a href="https://handbook.unimelb.edu.au/view/2010/B-MUS">https://handbook.unimelb.edu.au/view/2010/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 Course(s):</b>	Bachelor of Science