

## 620-619 Representation Theory

<b>Credit Points:</b>	12.50
<b>Level:</b>	9 (Graduate/Postgraduate)
<b>Dates &amp; Locations:</b>	2009, This subject commences in the following study period/s: Semester 1, - Taught on campus. On-campus.
<b>Time Commitment:</b>	Contact Hours: 36 hours comprising 2 one-hour lectures per week and 1 one-hour practice class per week. Total Time Commitment: 3 contact hours and 7 hours private study per week.
<b>Prerequisites:</b>	None.
<b>Corequisites:</b>	None.
<b>Recommended Background Knowledge:</b>	It is recommended that students have completed a third year subject in algebra (equivalent to 620-321 [2008] Algebra).
<b>Non Allowed Subjects:</b>	None.
<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>	Prof Arun Ram
<b>Subject Overview:</b>	Symmetries arise in mathematics as groups. Representation Theory is the study of groups via their action on vector spaces. It has important applications in many fields: physics, chemistry, economics, biology and others. This subject provides students with the opportunity to study modules, $SL_2$ , cyclic and dihedral groups, diagram algebras: Temperley-Lieb, symmetric group and Hecke algebras, Brauer and BMW algebras, compact Lie groups, loop groups, affine Lie algebras and Dynkin diagrams, characters and character formulas, Induction, restriction and tensor products, connections to statistical mechanics, mathematical physics and geometry.
<b>Objectives:</b>	After completing this subject students should be able to: <ul style="list-style-type: none"> <li>- understand the concepts of irreducible representations, indecomposable representations, group algebras, semisimplicity;</li> <li>- understand the concepts of characters, composition series, induction and restriction;</li> <li>- understand how to label representations of small groups and diagram algebras;</li> <li>- describe dimensions and characters of representations of symmetric groups, dihedral groups, and cyclic groups;</li> <li>- describe dimensions and characters of semisimple Lie algebras;</li> <li>- give examples of nonsemisimple algebras and representations.</li> <li>- have the ability to pursue further studies in this and related areas.</li> </ul>
<b>Assessment:</b>	Up to 50 pages of written assignments (50%: two assignments worth 25% each, due mid and late in semester), a 3 hour written examination (50%, in the examination period).
<b>Prescribed Texts:</b>	TBA
<b>Recommended Texts:</b>	TBA
<b>Breadth Options:</b>	This subject is not available as a breadth subject.
<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>	Upon completion of this subject, students should gain the following generic skills: <ul style="list-style-type: none"> <li>- Problem-solving skills including the ability to engage with unfamiliar problems and identify relevant solution strategies</li> <li>- Analytical skills through 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> </ul>

	<ul style="list-style-type: none"><li>- Through interactions with other students, 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>Related Majors/Minors/ Specialisations:</b>	R05 RM Master of Science - Mathematics and Statistics