

## ACE Network Subject Information Guide

### MATH4031: Algebra: Advanced Group Theory

Semester 1, 2019

#### Administration and contact details

Host Department	Mathematics and Statistics
Host Institution	The University of Western Australia
Name of lecturer	Michael Giudici
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#### Subject details

Handbook entry URL	<a href="http://handbooks.uwa.edu.au/unitdetails?code=math4031">http://handbooks.uwa.edu.au/unitdetails?code=math4031</a>
Subject homepage URL	N/A
Honours student hand-out URL	N/A
Start date:	25/2/2019
End date:	24/5/2019
Contact hours per week:	3
Lecture day and time:	<b>Mondays (9-10 Perth time)</b>
	<b>Thursdays 9-11am (Perth time)</b>
Description of electronic access arrangements for students (for example, WebCT)	UWA uses Blackboard for course materials. Access will be arranged.

#### Subject content

##### 1. Subject content description

This unit will focus on group theory and in particular understanding the structure of groups. It will cover topics such as nilpotent groups,

**soluble groups, simple groups, group extensions and automorphism groups. We will also look at theorems such as Burnside's  $p^a q^b$  Theorem, Schur-Zassenhaus Theorem and the Jordan-Hölder Theorem, just to name a few.**

## **2. Week-by-week topic overview**

The approximate topics are as follows but may change as the semester goes:

Week 1 Revision and Group Actions

Week 2 Group Automorphisms, Group Extensions

Week 3 Isomorphism Theorems, Nilpotent group

Week 4 Nilpotent groups, Frobenius groups

Week 5 Commutators, Composition Series

Week 6 Soluble groups

Week 7 Schur Zassenhaus Theorem

Week 9 Hall subgroups

Week 10 General linear groups and other related groups

Week 11 Classical groups

Week 12 Classical groups

## **3. Assumed prerequisite knowledge and capabilities**

A first course in group theory that has covered topics such as groups, cosets, homomorphisms, permutation groups, and quotient groups

## **4. Learning outcomes and objectives**

Students are able to (1) develop mathematical intuitions and the ability to articulate these intuitions within a formalism at an appropriate level; (2) prove results about algebraic structures and construct examples demonstrating key concepts; and (3) demonstrate a deep understanding of algebraic structures and the techniques involved in proving the main results in the field.

Students can understand and appreciate the power and beauty of mathematical abstraction; (4) communicate effectively with others; (5) present mathematical results in a logical and coherent fashion; and (6) undertake continuous learning, aware that an understanding of fundamentals is necessary for effective application.

**AQF specific Program Learning Outcomes and Learning Outcome Descriptors (if available):**

<b>AQF Program Learning Outcomes addressed in this subject</b>	<b>Associated AQF Learning Outcome Descriptors for this subject</b>
Insert Program Learning Outcome here	
Insert Program Learning Outcome here	Choose from list below
Insert Program Learning Outcome here	Choose from list below
Insert Program Learning Outcome here	Choose from list below
Insert Program Learning Outcome here	Choose from list below
Insert Program Learning Outcome here	Choose from list below
Insert Program Learning Outcome here	Choose from list below

**Learning Outcome Descriptors at AQF Level 8**

**Knowledge**

K1: coherent and advanced knowledge of the underlying principles and concepts in one or more disciplines

K2: knowledge of research principles and methods

**Skills**

S1: cognitive skills to review, analyse, consolidate and synthesise knowledge to identify and provide solutions to complex problem with intellectual independence

S2: cognitive and technical skills to demonstrate a broad understanding of a body of knowledge and theoretical concepts with advanced understanding in some areas

S3: cognitive skills to exercise critical thinking and judgement in developing new understanding

S4: technical skills to design and use in a research project

S5: communication skills to present clear and coherent exposition of knowledge and ideas to a variety of audiences

**Application of Knowledge and Skills**

A1: with initiative and judgement in professional practice and/or scholarship

A2: to adapt knowledge and skills in diverse contexts

A3: with responsibility and accountability for own learning and practice and in collaboration with others within broad parameters

A4: to plan and execute project work and/or a piece of research and scholarship with some independence

**5. Learning resources**

**There are many suitable textbooks that cover the topics in the course. One excellent example is 'Finite Group Theory' by Isaacs.**

**6. Assessment**

<b>Exam/assignment/classwork breakdown</b>					
<b>Final Exam</b>	60%	<b>Assignment</b>	15%	<b>Mid Sem Test</b>	25%
<b>Assignment due dates</b>					
	21 <sup>st</sup> March	11 <sup>th</sup> April	16 <sup>th</sup> May		



<b>Mid Semester Test 18<sup>th</sup> April</b>	
<b>Approximate exam date</b>	3-14 June

### **Institution Honours program details**

<b>Weight of subject in total honours assessment at host department</b>	12.5%
<b>Thesis/subject split at host department</b>	50/50
<b>Honours grade ranges at host department:</b>	
<b>H1</b>	80-100
<b>H2a</b>	70-79
<b>H2b</b>	60-69
<b>H3</b>	50-59