

UNIVERSITY OF WAIKATO
Department of Mathematics

2008 Paper outline for

MATH310-08A – Algebra and Number Theory

1. **Lecturers:** Dr Ian Hawthorn **Room:** G3.03 **Ph:** 838-4466 Extn 8217
 Assoc. Prof. Kevin Broughan **Room:** G3.22 **Ph:** 838-4423

2. **Lecturers' consultation hours:**

Dr Ian Hawthorn: Thursday 10.00 – 12.00noon
A/P Kevin Broughan: Thursday 4.00 – 6.00pm

3. **Lecture schedule:**

ALGEBRA (Dr Ian Hawthorn)

Monday	1.10	-	2.00pm	G3.33
Thursday	12.00	-	12.50pm	G3.33

NUMBER THEORY (A/P Kevin Broughan)

Monday	2.10	-	3.00pm	G3.33
Wednesday	9.00	-	9.50am	G3.33

4. **Test Schedule:** Monday 5 May 1.10 – 3.00pm G3.33

5. **Description of the paper:**

This paper consists of two sections which will be taught in parallel. Dr Hawthorn will teach the **Algebra section** and Prof Broughan will teach the **Number theory section**.

6. **Algebra Section:**

6.1 General

A modern algebra course at this level usually looks at three algebraic structures - groups, rings and fields. In this paper will will briefly introduce all three, but will concentrate mainly on groups. Groups are the mathematical structure used to describe symmetry. They have wide application to other parts of mathematics and to mathematical physics.

6.2 Specific topics

Definitions of Symmetry; Examples; Group axioms; Subgroups, cosets, Lagrange's theorem; Homomorphisms and isomorphisms, kernel and Image; cyclic groups; abelian groups; quotients and isomorphism theorems; normal subgroups, conjugacy, normalisers and centralisers, Permutation groups and group actions; Orbit-Stabiliser theorem; Burnside counting; direct and semidirect products; fundamental theorem of abelian groups; Sylows Theorem and p-groups; A brief survey of algebraic structures.

6.3 Required textbook

Contemporary Abstract Algebra (4th or 5th edn) by Joseph A. Gallian.

A copy of this text can be borrowed from the Mathematics Department office (G3.19).

6.4 Recommended reading

Other books which cover the same material and which could be useful include Durbin's book, Fraleigh's book, and the book by Dummit and Foote. Any book with a title similar to 'Abstract Algebra' or 'Modern Algebra' is likely to be relevant.

Consult the lecturer if you have questions about the relevance of a book.

7. Number Theory section:

Detailed information is available from the web page:

<http://www.math.waikato.ac.nz/~kab>

Follow the MATH310-08A link. Do not forget to refresh the paper web page since it changes often.

8. Assessment:

- 8.1 Internal assessment/examination ratio is the best of 0:1 or 1:1.
- 8.2 There will be **ONE test** plus **EIGHT assignments**; 4 Algebra assignments and 4 Number Theory assignments.
- 8.3 The internal mark will be made up of 6% from each assignment and 52% from the test.

9. Other information:

The Resource fee for this paper covers the costs of photocopied handouts.

Your attention is drawn to the following policies and regulations which are contained in the 2008 University Calendar.

Assessment Regulations 2006 (pg 122)
Student Discipline Regulations 2007 (pg 750)
Computer Systems Regulations 2006 (pg 769)
Policy on the Use of *Māori* for Assessment (pg 130)
Human Research Ethics Regulations 2005 (pg 109)
Student Research Regulations 2001 (pg 107)
Student Complaints Policy 2004 (pg 765)

Associate Professor Kevin Broughan
Dr Ian Hawthorn
2008