MATH2080 / MATH2980

Abstract and Computational Algebra - Semester 2, 2026

> **Course-page snapshot.** Generated 28 July 2026. Canvas remains the authoritative source for current announcements, files, assessment details, and changes to the schedule.

Lecturer	John Voight
Tutors	Daniel Bruwei, Ali Haidar, and Leah Neves
Enquiries	Please post mathematical questions on the Ed Discussion forum linked from Canvas. For administrative enquiries, email MATH2080@sydney.edu.au.
Consultation	Mondays, 3:30–4:30 pm, Carslaw 612
Textbook	David Dummit and Richard Foote, *Abstract Algebra*, 3rd edition, 2003

Course notes

Course notes (version as of 26 July 2026)

Schedule

Lecture topics may move slightly as the semester develops.

Day	Date	Topic	Assessments
Week 1			
1A	Mon, 3 Aug	Introduction	—
Lab	-	Speaking Magma	Ed Link
1B	Wed, 5 Aug	Mathematical language and proofs	—
Tutorial	-	*No tutorial this week*	—
1C	Thu, 6 Aug	Binary operations, magmas, and groups	—
Week 2			
2A	Mon, 10 Aug	Subgroups	—
Lab	-	Modular arithmetic and certificates	Ed Link
2B	Wed, 12 Aug	A bit of number theory	—
Tutorial	-	The coin game	Tutorial 2 Sheet
2C	Thu, 13 Aug	Order and cyclic groups	**Early Feedback Task** (*suggested* due date)
Week 3			
3A	Mon, 17 Aug	Dihedral and quaternion groups	—
Lab	-	Picturing groups	Ed Link
3B	Wed, 19 Aug	More on subgroups	—
Tutorial	-	Mystery Cayley graphs	Tutorial 3 Sheet
3C	Thu, 20 Aug	Permutations, signs, and alternating groups	**Assignment 1**: Canvas and PDF Solutions
Week 4			
4A	Mon, 24 Aug	Homomorphisms and isomorphisms	—
Lab	-	The 15-puzzle	Ed Link
4B	Wed, 26 Aug	Group actions and geometric examples	—
Tutorial	-	The rotations of a tetrahedron	Tutorial 4 Sheet
4C	Thu, 27 Aug	Cayley's theorem and permutation representations	—
Week 5			
5A	Mon, 31 Aug	Equivalence relations, congruence, and quotient sets	—

Day	Date	Topic	Assessments
Lab	-	The Rubik's cube	Ed Link
5B	Wed, 2 Sep	Cosets and Lagrange's theorem	—
Tutorial	-	A group you can draw: two coset geometries	Tutorial 5 Sheet
5C	Thu, 3 Sep	Normal subgroups and quotient groups	—
Week 6			
6A	Mon, 7 Sep	Quotient maps and natural homomorphisms	—
Lab	-	S_4 under the microscope	Ed Link
6B	Wed, 9 Sep	Isomorphism theorems	—
Tutorial	-	$GL_2(F_3)$ and a hidden S_4	Tutorial 6 Sheet
6C	Thu, 10 Sep	Composition series and solvability	—
Week 7			
7A	Mon, 14 Sep	Conjugation, class equation, and automorphisms	—
Lab	-	The icosahedron: A_5 everywhere	Ed Link
7B	Wed, 16 Sep	Sylow theorems	—
Tutorial	-	*The quiz is held in tutorial this week*	—
7C	Thu, 17 Sep	Sylow applications and simplicity of A_5	**Quiz**
Week 8			
8A	Mon, 21 Sep	Direct products	—
Lab	-	A scavenger hunt in the LMFDB	Ed Link
8B	Wed, 23 Sep	Finite abelian groups	—
Tutorial	-	The automorphisms of Q_8, via a cube	Tutorial 8 Sheet
8C	Thu, 24 Sep	Groups of small order	—
Mid-semester break			
—	Mon, 28 Sep–Fri, 2 Oct	*Mid-semester break — no class*	—
Week 9			
—	Mon, 5 Oct	*Labour Day holiday — no class*	—
Lab	-	Codes and sporadic groups (*2980: lab is take home!*)	Ed Link
9B	Wed, 7 Oct	Rings: definitions and first examples	—
Tutorial	-	Sixteen matrices	Tutorial 9 Sheet
9C	Thu, 8 Oct	Polynomial rings, matrix rings, and group rings	—
Week 10			
10A	Mon, 12 Oct	Ring homomorphisms and quotient rings	—
Lab	-	A zoo of rings	Ed Link
10B	Wed, 14 Oct	Ideals, prime ideals, and maximal ideals	—
Tutorial	-	The other ring with four elements	Tutorial 10 Sheet
10C	Thu, 15 Oct	Polynomial rings	**Assignment 2**: Canvas and PDF Solutions
Week 11			
11A	Mon, 19 Oct	Polynomial division, gcds, and ideals	—
Lab	-	Finite fields and an isomorphism you cannot invert	Ed Link
11B	Wed, 21 Oct	Irreducible elements, roots, and finite fields	—
Tutorial	-	The first year's dream comes true	Tutorial 11 Sheet
11C	Thu, 22 Oct	Multivariable polynomial rings, monomial orders, and normal forms	—
Week 12			

Day	Date	Topic	Assessments
12A	Mon, 26 Oct	Gröbner bases and ideal membership	—
Lab	-	Gröbner bases: algebra that decides	Ed Link
12B	Wed, 28 Oct	Buchberger's algorithm, elimination, and solving equations	—
Tutorial	-	Gauss, meet Buchberger	Tutorial 12 Sheet
12C	Thu, 29 Oct	Elliptic curves	—
Week 13			
13A	Mon, 2 Nov	Revision (TBD)	—
Lab	-	Elliptic curves: a group given by polynomial equations	Ed Link
13B	Wed, 4 Nov	Revision (TBD)	—
Tutorial	-	The first group of the course is also the last	Tutorial 13 Sheet
13C	Thu, 5 Nov	Revision (TBD)	—

Computational labs (Magma)

Magma is available through Ed Workspaces. Open Workspaces using the `>_` icon in the upper-right corner, choose the appropriate lab, and click *Fork* to make your own copy.

No local installation is required. If instead you wish to download a copy to your home machine--this will only be useful if you want to use Magma for your assignments and don't have access to the internet, so can't use Ed--then there's a Mac binary, Windows binary, and i386/PC Linux version with package, along with installation instructions. (No license is needed, since it is just the student version; Ed does not have such a restriction.)

MATH2080 vs. MATH2980

MATH2980 is the advanced version of MATH2080. The early feedback task is exactly the same. Otherwise, the material is substantially similar but with additional topics and development. For example, some material and proofs are only for the advanced version (indicated as "Advanced Notes" in the course notes); the assignments, quiz, and final examination contain some common questions and some questions specific to each unit.

If you wish to pursue honours, or are excited about upcoming third-year courses, you should seriously consider signing up for the advanced unit 2980! The investment now will pay off later.

Useful links

- Second-year Mathematics and Statistics
- Handbooks
  - Second-year Mathematics and Statistics handbook
  - University handbooks
- Learning Hub (Mathematics)
- Academic integrity
- Examination information
- Student support services

Teaching material is intended for enrolled University of Sydney students. Unless otherwise specified, the University of Sydney holds copyright.