MATH1061/MATH7861 — Discrete Mathematics

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Staff

- **Dr Sara Davies** (course coordinator) — Office 69-704 — sara.davies@uq.edu.au — Office hours: Mon 1-2pm (works Mon/Tue/Thu)
- **Dr Katie Clinch** — Office 69-723 — k.clinch@uq.edu.au — Office hours: Thu 3-4pm
- **Isaac Beh** — Lecture assistant

Textbook

Discrete Mathematics with Applications by Susanna Epp, 4th or 5th (metric) edition — available in hard copy or e-book via the library.

Course activities (10 hrs/week expected workload)

- **Before each class** (1 hr prep): watch videos, answer multiple-choice questions.
- **Three 1-hour lectures/week**: answer questions and solve problems in class.
- **One 2-hour Active Class/week** (starts Week 2): apply previous week's lecture content, discuss with peers/demonstrators, complete Assessed Exercises (work together or independently, submit individually for feedback).
- **~3 hrs/week individual study**: revise, complete practice problems.

Assessment

Component	Weight
Applied Classes (best 8 of 12)	30%
In-semester exam	20%
Final exam	50%

- Applied classes for MATH1061 and MATH7861 share some questions, differ on others.
- Different **hurdles** apply on the final exam for certain course grades — read the course profile carefully.
- Formula sheet provided for exams (see Blackboard).

In-semester exam: date announced 5pm August 6th. Hold free: 5 September (evening), 11-13 September, 18-20 September. **Final exam**: centrally scheduled by UQ, held in the November examination period.

Support

- Lecturers / Lecture assistant / casual academics.
- **Ed Discussion Board** — Q&A forum monitored by staff and students.
- **First Year Mathematics Learning Centre (FYLC)** — Priestley Building (67), Room 442/443. Starts Week 1, runs to the exam period.
  - Mon 11am-2pm, Tue 1-4pm, Wed 1-4pm, Thu 11am-2pm, Fri 1-4pm.
  - https://smp.uq.edu.au/current-students/first-year-learning-centres
- **MATHS@UQ** — self-paced skills videos (Course Resources → Course Help → "SMP Course Help").

Student Access Plans (SAP) & Exam Adjustments (EA)

For disability, neurodivergence, mental health/medical conditions, caring responsibilities, pregnancy, elite athletes, religious observance, defence service, or exceptional circumstances. Covers assignment extensions, alternative assessment formats, and exam adjustments (extra time, rest breaks, separate room, etc.). Arrange via a Student Adviser (Student Central, Building 42 St Lucia) or student.services@uq.edu.au / (07) 3365 1704 — aim for the first four weeks of semester.

Course outline

- **Logic** — symbolic logic underpins computer science; formulating proofs correctly.
- **Number theory and methods of proof** — structuring proofs, proof techniques.
- **Set theory** — the language modern mathematics is built on.
- **Functions and relations** — functions in a more general context; relations.
- **Group theory** — a set with a binary operation (e.g. integers + addition).
- **Counting** — techniques for counting.
- **Graph theory** — points and lines joining them; widely used in modelling.

Schedule

Week start	Mon 10am	Thu 2pm	Thu 1pm	Lecturer
27/07	L1 Introduction	L2 Logical form, logical equivalence (V1,V2)	L3 Conditional statements (V3)	Davies
03/08	L4 Valid & invalid arguments, determining validity (V4,V5)	L5 Determining validity, quantified statements (V6)	L6 Negation of quantified statements, multiple quantifiers (V7,V8)	Davies
10/08	L7 Direct proofs & counterexamples (V9)	L8 Proof by contradiction (V10)	L9 Proof by contraposition, rational numbers (V11,V12)	Davies
17/08	L10 Divisibility (V13)	L11 Modular arithmetic (V14)	L12 The Euclidean Algorithm (V15)	Clinch

Week start	Mon 10am	Thu 2pm	Thu 1pm	Lecturer
24/08	L13 Sequences, mathematical induction (V16,V17)	L14 Strong induction, well-ordering principle (V18)	Review class	Clinch
31/08	L15 Recursive definitions (V19)	L16 Solving recurrence relations (V20)	L17 Set theory definitions & examples (V21,V22)	Clinch
07/09	L18 Properties of sets, functions on general sets (V23,V24)	L19 One-to-one, onto & inverse functions (V25)	L20 Composition of functions (V26)	Davies
14/09	L21 Cardinalities (V27)	L22 Countable & uncountable sets (V28)	L23 Relations on sets: reflexivity, symmetry, transitivity (V29,V30)	Davies
21/09	L24 Equivalence relations (V31)	L25 Partial order relations (V32)	L26 Groups: definitions & examples (V33)	Davies
28/09	*in-semester break*			
05/10	public holiday	L27 Elementary properties of groups (V34)	L28 Fields: definitions & examples (V36)	Clinch
12/10	L29 Introduction to counting (V37)	L30 Counting selections (V38)	L31 Intro to probability, binomial coefficients (V39,V40)	Clinch
19/10	L32 Inclusion/exclusion (V41)	L33 Pigeonhole principle, intro to graph theory (V42,V43)	L34 Walks, trails, circuits (V44)	Clinch
26/10	L35 Matrix representations of graphs (V45)	L36 Trees (V46)	Final review class	Davies

Applied Classes

Every Applied Class runs from the one semester-wide problem set — see practice-problems[1], which reproduces all 46 sections in full, each with its problems and full worked solutions, plus the section index and textbook page mappings.

Lectures

Week 1

- 2026-07-27-welcome-and-intro-problems[2] — Lecture 1
- 2026-07-30-logical-form-and-equivalence[3] — Lecture 2
- 2026-07-30-conditional-statements[4] — Lecture 3

Week 2

- 2026-08-03-valid-and-invalid-arguments[5] — Lecture 4
- 2026-08-06-quantified-statements[6] — Lecture 5
- 2026-08-06-negation-and-multiple-quantifiers[7] — Lecture 6

Week 3

- 2026-08-10-direct-proof-and-counterexample[8] — Lecture 7
- 2026-08-13-proof-by-contradiction[9] — Lecture 8
- 2026-08-13-proof-by-contraposition[10] — Lecture 9

Week 4

- 2026-08-17-divisibility[11] — Lecture 10
- 2026-08-20-modular-arithmetic[12] — Lecture 11
- 2026-08-20-euclidean-algorithm[13] — Lecture 12

[1] courses/math1061/practice-problems.pdf
[2] courses/math1061/2026-07-27-welcome-and-intro-problems.pdf
[3] courses/math1061/2026-07-30-logical-form-and-equivalence.pdf
[4] courses/math1061/2026-07-30-conditional-statements.pdf
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[12] courses/math1061/2026-08-20-modular-arithmetic.pdf
[13] courses/math1061/2026-08-20-euclidean-algorithm.pdf

Reference notes

- logical-connectives[14] · logical-equivalence-laws[15] · conditional-statements[16] · valid-argument-forms[17] · determining-argument-validity[18]
- quantified-statements[19] · proof-techniques[20] · rational-and-irrational-numbers[21] · divisibility-and-factorisation[22] · modular-arithmetic[23] · gcd-lcm-and-euclidean-algorithm[24]
- practice-problems[25]

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