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. Both halves are expected — the videos *and* the MCQs.
- **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.

One class, two names. The **Active Class** and the **Applied Class** are the same thing, and the rest of these notes call it the Applied Class. One 2-hour weekly session, two names — the assessed one.

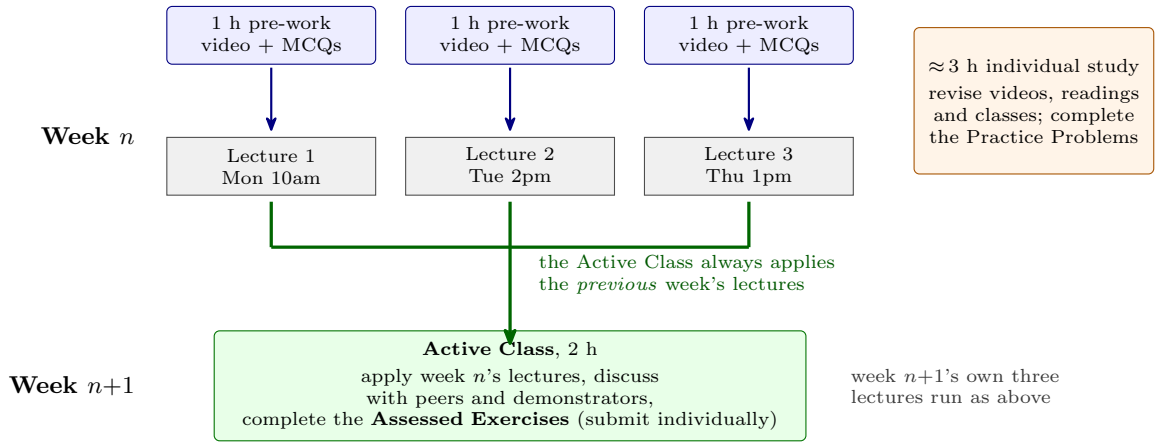


Figure 1: How a week's work is wired together, and the one-week offset that trips people up. Each lecture is preceded by its own hour of pre-work video and multiple-choice questions; the Active Class that assesses those lectures does not run until the following week, alongside that week's own three lectures. The hour figures add up to about eleven against the ten stated for the week, which is presumably why the study line is an approximation.

Assessment

Component	Weight	When
Applied Classes (best 8 of 12)	30%	12 weekly windows, 3/08 – 30/10

Component	Weight	When
In-semester exam ("In-semester Saturday")	20%	5/09/2026 – 20/09/2026
Final exam	50%	7/11/2026 – 21/11/2026

Applied class windows: 3–7/08, 10–14/08, 17–21/08, 24–28/08, 31/08–4/09, 7–11/09, 14–18/09, 21–25/09, 6–9/10, 12–16/10, 19–23/10, 26–30/10.

Applied classes for MATH1061 and MATH7861 share some questions and differ on others.

Keep three date bands free for the in-semester exam. It is scheduled centrally by UQ, and until the date is announced you must hold **5 September**, **11–13 September** and **18–20 September** free: all of the Friday (evening only), Saturday and Sunday dates in those bands. So it is the Friday of each band that is evening-only, and 5 September 2026 is itself a Saturday. The announcement lands at **5pm on 6 August**. The final examination is likewise centrally scheduled, in the November examination period.

Grade cutoffs and the exam hurdle

The final exam is a **hurdle that escalates with the grade** — it is not one pass mark. You need the overall mark *and* the stated percentage of total marks on the end-of-semester exam:

Grade	Final mark	End-of-semester exam hurdle
7	85%	80%
6	75%	70%
5	65%	60%
4 (Pass)	50%	45%
3	45%	40%
2	20%	—
1	$< 20\%$	—

So an overall 80% with a 65% exam is a **5**, not a 6.

Exam format

Both exams are **closed book with no written materials permitted**, paper-based, invigilated in person, with a **formula sheet provided** (see formula-sheet[1] for what's on it). Calculator: **Casio FX82 series only**, or a UQ-approved and labelled calculator.

[1] courses/math1061/formula-sheet.pdf

	In-semester (20%)	Final (50%)
Format	Multiple choice and short answer	Short answer and problem solving
Time	10 min perusal + **60 min**	10 min perusal + **120 min**
Location	—	St Lucia, scheduled by UQ Examinations

See sample-mid-semester-exams[2] for the two sample papers and their structure.

Applied class rules

- **No extensions and no deferrals.** Miss a week and that week scores 0 — which is what the "best 8 of 12" is there to absorb.
- You may attend **any other applied class in the same week**, but there is no submission outside that week.
- **AI tools and other electronic assistance are not permitted.**
- The profile's own advice: missing more than 4 is the point to reconsider the semester.

Extensions, deferrals, supplementary

- Extensions are applied for via my.UQ, **on or before the due date**, with a medical certificate dated *prior* to the due date. A SAP grants a maximum of 7 days; in-semester extensions are capped at 4 weeks in total.
- Deferred exam applications are due **no later than 5 calendar days** after the original exam. A deferred exam cannot itself be deferred.
- **Supplementary assessment is available.** For a grade 3 it is a **2-hour exam** similar in style to the end-of-semester exam, and you need **50%** to convert to 3S4.

Support

- **General enquiries: `math1061@uq.edu.au` / `math7861@uq.edu.au`.** Course business goes to the course address, not to a lecturer's personal one.
- 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. Help for any 1st-year mathematics course, and for MATH7861. Starts Week 1, runs to the exam period.

[2] courses/math1061/sample-mid-semester-exams.pdf

  - 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").

FYLC Basic Skills Workshops (Weeks 1 & 2, Room 67-443)

Seven one-off workshops, each a diagnostic quiz on the topic plus tutor help. Aimed at students returning to mathematics after a break, coming from non-traditional pathways (UQ College, TAFE), repeating, or who struggled with senior high-school mathematics.

Topic	When
1. Fractions and Surds	Week 1, Mon 11am–1pm
2. Basic Algebra 1	Week 1, Tue 1–3pm
3. Basic Algebra 2	Week 1, Wed 1–3pm
4. Powers and logs	Week 1, Thu 11am–1pm
5. Trigonometry	Week 1, Fri 1–3pm
6. Differentiation	Week 2, Thu 11am–1pm
7. Integration	Week 2, Fri 1–3pm

The first three (fractions and surds, and the two algebra sessions) are the ones flagged for this course, presumably because they are the sessions it leans on hardest.

Inclusivity

- **SMP Inclusivity Champion for MATH1061: Jacinda Ginges** — j.ginges@uq.edu.au. Every cohort has a nominated contact, but you may approach any champion you prefer.
- School-wide: smp.edi@uq.edu.au · https://smp.uq.edu.au/inclusivity

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.

Learning outcomes

After successfully completing this course you should be able to:

1. Construct proofs.
2. Apply logic, set theory, relations, induction, counting, probability, algebraic structures and number theory.
3. Demonstrate well-founded knowledge of the discipline.
4. Select appropriate written, symbolic and graphical communication.
5. Understand applications to computer programming and logic.

Course outline

Seven topics. Two of the headings are narrower than what the semester actually covers; the course profile's topic list names the extra material, which is added below.

- **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). The profile adds fields and applications of finite fields; the fields lecture is L28.
- **Counting** — techniques for counting, which is a lot more complicated than it sounds. The profile adds introductory probability, which arrives at L31.
- **Graph theory** — points and lines joining them; widely used in modelling.

There is **some overlap with Year 11 and 12 Specialist Mathematics**.

Schedule

No lectures or applied classes on the public holidays — **Ekka Wednesday 12 August** and **King's Birthday Monday 5 October**. There are **no make-up classes**.

The lecture slots are Mon 10am, Tue 2pm, Thu 1pm.

Week start	Mon 10am	Tue 2pm	Thu 1pm	Lecturer
27/07	L1 Introduction	L2 Logical form, logical equivalence (V1,V2)	L3 Conditional statements (V3)	Davies

Week start	Mon 10am	Tue 2pm	Thu 1pm	Lecturer
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
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

Week start	Mon 10am	Tue 2pm	Thu 1pm	Lecturer
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

What is done and submitted in the Applied Class is the week's **Assessed Exercises** (see Assessment above); the course profile says only that "the exercises are to be completed during the weekly Applied Classes".

Separately, the course ships one semester-wide problem set — see practice-problems[3], which has all 46 sections in full, each with its problems and full worked solutions, plus the section index and textbook page mappings. That set belongs to the **individual study** hours, not to the class.

Lectures

> **The middle date of each week is suspect.** Every week's three notes are dated Mon / Thu / Thu — 27/07, 30/07, 30/07 for Week 1, 03/08, 06/08, 06/08 for Week 2, and so on. The second lecture of each week is in the **Tue 2pm** slot (see above), so it actually falls two days earlier than its filename says. The lecture numbering, the week, and the order are right in every case; only that middle date is in doubt, and the filenames are left as they are so existing links keep resolving. From Week 10 on, every note carries its real slot's date, so the Tuesday lectures (27 and 30) are filed under Tuesday.

Week 1

- 2026-07-27-welcome-and-intro-problems[4] — Lecture 1

[3] courses/math1061/practice-problems.pdf
[4] courses/math1061/2026-07-27-welcome-and-intro-problems.pdf

- 2026-07-30-logical-form-and-equivalence[5] — Lecture 2
- 2026-07-30-conditional-statements[6] — Lecture 3

Week 2

- 2026-08-03-valid-and-invalid-arguments[7] — Lecture 4
- 2026-08-06-quantified-statements[8] — Lecture 5
- 2026-08-06-negation-and-multiple-quantifiers[9] — Lecture 6

Week 3

- 2026-08-10-direct-proof-and-counterexample[10] — Lecture 7
- 2026-08-13-proof-by-contradiction[11] — Lecture 8
- 2026-08-13-proof-by-contraposition[12] — Lecture 9

Week 4

- 2026-08-17-divisibility[13] — Lecture 10
- 2026-08-20-modular-arithmetic[14] — Lecture 11
- 2026-08-20-euclidean-algorithm[15] — Lecture 12

Week 5

- 2026-08-24-sequences-and-mathematical-induction[16] — Lecture 13
- 2026-08-27-strong-induction-and-well-ordering[17] — Lecture 14

Week 6

- 2026-08-31-recursive-definitions[18] — Lecture 15
- 2026-08-31-solving-recurrence-relations[19] — Lecture 16
- 2026-09-03-set-theory-definitions[20] — Lecture 17

[5] courses/math1061/2026-07-30-logical-form-and-equivalence.pdf
[6] courses/math1061/2026-07-30-conditional-statements.pdf
[7] courses/math1061/2026-08-03-valid-and-invalid-arguments.pdf
[8] courses/math1061/2026-08-06-quantified-statements.pdf
[9] courses/math1061/2026-08-06-negation-and-multiple-quantifiers.pdf
[10] courses/math1061/2026-08-10-direct-proof-and-counterexample.pdf
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[13] courses/math1061/2026-08-17-divisibility.pdf
[14] courses/math1061/2026-08-20-modular-arithmetic.pdf
[15] courses/math1061/2026-08-20-euclidean-algorithm.pdf
[16] courses/math1061/2026-08-24-sequences-and-mathematical-induction.pdf
[17] courses/math1061/2026-08-27-strong-induction-and-well-ordering.pdf
[18] courses/math1061/2026-08-31-recursive-definitions.pdf
[19] courses/math1061/2026-08-31-solving-recurrence-relations.pdf
[20] courses/math1061/2026-09-03-set-theory-definitions.pdf

- 2026-09-03-set-properties-and-functions[21] — Lecture 18

  Dates in this week need checking. Lecture 16 is dated Mon 31/08 and Lectures 17 and 18 Thu 03/09, which fills the week's three slots. That leaves Lecture 15 also dated 31/08, which cannot be right; L15 probably belongs to the previous week's Thursday slot (Thu 27/08, listed as "Review class"), with the course running one lecture ahead of the published schedule above. Confirm against Blackboard before relying on these dates.

Week 7

- 2026-09-07-functions-one-to-one-onto-inverse[22] — Lecture 19
- 2026-09-08-composition-of-functions[23] — Lecture 20

  Dated on the one-ahead reading from Week 6's note: Lecture 19 on the Monday, Lecture 20 on the Tuesday. The published schedule has them a slot later each. The week's third slot was a review session for the in-semester exam, with no new content, so there is no third note.

Week 8

- 2026-09-14-cardinalities[24] — Lecture 21
- 2026-09-15-countable-and-uncountable-sets[25] — Lecture 22
- 2026-09-17-relations-reflexivity-symmetry-transitivity[26] — Lecture 23

  Back on the published schedule: Lectures 21, 22 and 23 were given on Monday 14/09, Tuesday 15/09 and Thursday 17/09, as the table above lists them.

Week 9

- 2026-09-21-equivalence-relations[27] — Lecture 24
- 2026-09-22-partial-order-relations[28] — Lecture 25
- 2026-09-24-definitions-and-examples-of-groups[29] — Lecture 26

  Lecture 24's last two questions are finished at the start of Lecture 25.

Week 10

[21] courses/math1061/2026-09-03-set-properties-and-functions.pdf
[22] courses/math1061/2026-09-07-functions-one-to-one-onto-inverse.pdf
[23] courses/math1061/2026-09-08-composition-of-functions.pdf
[24] courses/math1061/2026-09-14-cardinalities.pdf
[25] courses/math1061/2026-09-15-countable-and-uncountable-sets.pdf
[26] courses/math1061/2026-09-17-relations-reflexivity-symmetry-transitivity.pdf
[27] courses/math1061/2026-09-21-equivalence-relations.pdf
[28] courses/math1061/2026-09-22-partial-order-relations.pdf
[29] courses/math1061/2026-09-24-definitions-and-examples-of-groups.pdf

- 2026-10-06-elementary-properties-of-groups[30] — Lecture 27
- 2026-10-08-definitions-and-examples-of-fields[31] — Lecture 28

  No lecture on Monday 5 October (King's Birthday). Lecture 27's powers and cyclic subgroups are finished at the start of Lecture 28.

Week 11

- 2026-10-12-introduction-to-counting[32] — Lecture 29
- 2026-10-13-counting-selections[33] — Lecture 30

  Lecture 29's Activity 3 is finished at the start of Lecture 30.

Week 12

- 2026-10-19-probability-binomial-coefficients[34] — Lecture 31
- 2026-10-20-inclusion-exclusion[35] — Lecture 32
- 2026-10-22-pigeonhole-principle-introduction-to-graph-theory[36] — Lecture 33

  Lecture 31 was given in Week 12's Monday slot, so from here the course runs one lecture behind the published schedule above. Lecture 30's BARBARA activity is finished at the start of Lecture 31.

Week 13

- 2026-10-26-walks-trails-and-circuits[37] — Lecture 34
- 2026-10-27-matrix-representations-of-graphs[38] — Lecture 35
- 2026-10-29-trees[39] — Lecture 36

  Still one lecture behind, so Lecture 36 took the Thursday slot the schedule gives to the final review class. It is the last lecture of the course. Review sessions for the final exam run the following week.

[30] courses/math1061/2026-10-06-elementary-properties-of-groups.pdf
[31] courses/math1061/2026-10-08-definitions-and-examples-of-fields.pdf
[32] courses/math1061/2026-10-12-introduction-to-counting.pdf
[33] courses/math1061/2026-10-13-counting-selections.pdf
[34] courses/math1061/2026-10-19-probability-binomial-coefficients.pdf
[35] courses/math1061/2026-10-20-inclusion-exclusion.pdf
[36] courses/math1061/2026-10-22-pigeonhole-principle-introduction-to-graph-theory.pdf
[37] courses/math1061/2026-10-26-walks-trails-and-circuits.pdf
[38] courses/math1061/2026-10-27-matrix-representations-of-graphs.pdf
[39] courses/math1061/2026-10-29-trees.pdf

Reference notes

- logical-connectives[40] · logical-equivalence-laws[41] · conditional-statements[42] · valid-argument-forms[43] · determining-argument-validity[44]
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