



## UNSW Course Outline

# COMP2111 System Modelling and Design - 2024

Published on the 12 Feb 2024

## General Course Information

Course Code : COMP2111

Year : 2024

Term : Term 1

Teaching Period : T1

Is a multi-term course? : No

Faculty : Faculty of Engineering

Academic Unit : School of Computer Science and Engineering

Delivery Mode : Multimodal

Delivery Format : Standard

Delivery Location : Kensington

Campus : Sydney

Study Level : Undergraduate

Units of Credit : 6

### Useful Links

[Handbook Class Timetable](#)

## Course Details & Outcomes

### Course Description

This course introduces rigorous and formal methods for modelling system behaviour. These methods support the modelling of abstract specifications and the refinement of abstract specifications through to concrete implementations. Consistency of formal development is

verified by proof obligations and formal proof. The course will cover: specification, refinement, implementation, proof obligations, and proof. It re-inforces, and builds on, prerequisite knowledge from MATH1081, especially set theory and predicate logic. The course will use case-studies and assignments to develop competence. The methods developed in this course are used in the SENG2011 workshops and in safety-critical industrial contexts.

## Course Learning Outcomes

Course Learning Outcomes
CLO1 : appreciate the relevance of discrete mathematics to computing
CLO2 : make effective use of discrete mathematics concepts
CLO3 : carry out rigorous reasoning about computing artefacts
CLO4 : effectively employ a toolkit of formal modelling approaches frequently used in computing

Course Learning Outcomes	Assessment Item
CLO1 : appreciate the relevance of discrete mathematics to computing	• final exam
CLO2 : make effective use of discrete mathematics concepts	• 3 Assignments • final exam
CLO3 : carry out rigorous reasoning about computing artefacts	• 3 Assignments • final exam
CLO4 : effectively employ a toolkit of formal modelling approaches frequently used in computing	• 3 Assignments • final exam

## Learning and Teaching Technologies

Moodle - Learning Management System | CSE systems | EdStem | Zoom

## Learning and Teaching in this course

Lectures will include exercises where we examine the practice of formulating and proving mathematical properties of relevance to Computer Science. Weekly tutorials aim to cement understanding and provide immediate and ongoing feedback for students to assess their understanding of the course material. Assignments aim to deepen analysis and understanding via additional examples and problems. There are no laboratory classes for this subject.

Assignments are tentatively due at the end of weeks 4, 7, and 10.

# Assessments

## Assessment Structure

Assessment Item	Weight	Relevant Dates
3 Assignments	50%	Due Date: TBA
final exam	50%	Due Date: TBA - During Exam Week

## Assessment Details

### 3 Assignments

#### Assessment Overview

3 assignments of roughly equal weight; students translate provided requirements into formal specifications that they then refine to code using the methods taught in the course. Typically, deliverables include at least the source code (in C) and a document (in LaTeX) that details (a) how the requirements match the specification (b) how the specification and the implementation are related (c) proofs to substantiate any claims made in (b).

#### Course Learning Outcomes

- CL02 : make effective use of discrete mathematics concepts
- CL03 : carry out rigorous reasoning about computing artefacts
- CL04 : effectively employ a toolkit of formal modelling approaches frequently used in computing

### final exam

#### Assessment Overview

the final exam will test the students understanding of the concepts introduced in the course; feedback typically consists of published solutions to the exam paper and individual marks for questions

#### Course Learning Outcomes

- CL01 : appreciate the relevance of discrete mathematics to computing
- CL02 : make effective use of discrete mathematics concepts
- CL03 : carry out rigorous reasoning about computing artefacts
- CL04 : effectively employ a toolkit of formal modelling approaches frequently used in computing

## General Assessment Information

### Grading Basis

Standard

# Course Schedule

Teaching Week/Module	Activity Type	Content
Week 1 : 12 February - 18 February	Lecture	Calculating with Logic
Week 2 : 19 February - 25 February	Lecture	Discrete maths recap
Week 3 : 26 February - 3 March	Lecture	Recursion and induction
Week 4 : 4 March - 10 March	Lecture	Propositional logic
	Assessment	A1 released (tentative)
Week 5 : 11 March - 17 March	Lecture	Predicate logic
	Assessment	A1 due (tentative)
Week 6 : 18 March - 24 March	Other	Flexibility week
Week 7 : 25 March - 31 March	Lecture	State machines, automata
	Assessment	A2 released (tentative)
Week 8 : 1 April - 7 April	Lecture	Hoare logic
	Assessment	A2 due (tentative)
Week 9 : 8 April - 14 April	Lecture	Hoare logic + tool demo
	Assessment	A3 released (tentative)
Week 10 : 15 April - 21 April	Lecture	Lambda calculus, wrap-up
	Assessment	A3 due (tentative)

## Attendance Requirements

Students are strongly encouraged to attend all classes and review lecture recordings.

## General Schedule Information

Please see the timetable: <https://timetable.unsw.edu.au/2024/COMP2111.html>

or the course website: <https://www.cse.unsw.edu.au/~cs2111/> for more scheduling information.

## Course Resources

### Prescribed Resources

None.

### Recommended Resources

The following resources provide useful background reading:

- Eric Lehman, F. Thomson Leighton, and Albert R. Meyer, [Discrete Mathematics for Computer Science](#). 1042 pages, online textbook, January 2018 edition.
- Carroll Morgan, (In-)Formal Methods: How to write programs that work, draft February 2021. (Appendices D.4-D.14, then D.1-D.3, then E.)
- John C. Reynolds , [The Craft of Programming](#) ([download](#)), Prentice-Hall, 1981.

## Additional Costs

None.

## Course Evaluation and Development

This course is being continuously improved and we will conduct a survey at the end of session to obtain feedback on the quality of the various course components. Your participation in the survey will be greatly appreciated.

Feedback from the last two years' offerings was generally positive, with the following actionable feedback:

- *Some questions in assignments don't have immediately apparent ways to tell if an answer is correct.* For questions involving deductive reasoning, this ideally shouldn't be the case and we will keep it in mind. However, note that certain questions, particularly those involving modelling, have no one correct answer.
- *There is no textbook for the course.* I do not intend to use a textbook for the course, but I appreciate that having learning material in writing beyond the slides would be valuable. Some written lecture notes now exist, but they are unfortunately not complete.

## Staff Details

Position	Name	Email	Location	Phone	Availability	Equitable Learning Services Contact	Primary Contact
	Johannes Aarn Pohjola					Yes	Yes

## Other Useful Information

### Academic Information

#### I. Special consideration and supplementary assessment

If you have experienced an illness or misadventure beyond your control that will interfere with your assessment performance, you are eligible to apply for Special Consideration prior to, or within 3 working days of, submitting an assessment or sitting an exam.

Please note that UNSW has a Fit to Sit rule, which means that if you sit an exam, you are declaring yourself fit enough to do so and cannot later apply for Special Consideration.

For details of applying for Special Consideration and conditions for the award of supplementary

assessment, please see the information on UNSW's [Special Consideration page](#).

## II. Administrative matters and links

All students are expected to read and be familiar with UNSW guidelines and policies. In particular, students should be familiar with the following:

- [Attendance](#)
- [UNSW Email Address](#)
- [Special Consideration](#)
- [Exams](#)
- [Approved Calculators](#)
- [Academic Honesty and Plagiarism](#)
- [Equitable Learning Services](#)

## III. Equity and diversity

Those students who have a disability that requires some adjustment in their teaching or learning environment are encouraged to discuss their study needs with the course convener prior to, or at the commencement of, their course, or with the Equity Officer (Disability) in the Equitable Learning Services. Issues to be discussed may include access to materials, signers or note-takers, the provision of services and additional exam and assessment arrangements. Early notification is essential to enable any necessary adjustments to be made.

## IV. Professional Outcomes and Program Design

Students are able to review the relevant professional outcomes and program designs for their streams by going to the following link: <https://www.unsw.edu.au/engineering/student-life/student-resources/program-design>.

*Note: This course outline sets out the description of classes at the date the Course Outline is published. The nature of classes may change during the Term after the Course Outline is published. Moodle or your primary learning management system (LMS) should be consulted for the up-to-date class descriptions. If there is any inconsistency in the description of activities between the University timetable and the Course Outline/Moodle/LMS, the description in the Course Outline/Moodle/LMS applies.*

## Academic Honesty and Plagiarism

UNSW has an ongoing commitment to fostering a culture of learning informed by academic

integrity. All UNSW students have a responsibility to adhere to this principle of academic integrity. Plagiarism undermines academic integrity and is not tolerated at UNSW. *Plagiarism at UNSW is defined as using the words or ideas of others and passing them off as your own.*

Plagiarism is a type of intellectual theft. It can take many forms, from deliberate cheating to accidentally copying from a source without acknowledgement. UNSW has produced a website with a wealth of resources to support students to understand and avoid plagiarism, visit: [student.unsw.edu.au/plagiarism](http://student.unsw.edu.au/plagiarism). The Learning Centre assists students with understanding academic integrity and how not to plagiarise. They also hold workshops and can help students one-on-one.

You are also reminded that careful time management is an important part of study and one of the identified causes of plagiarism is poor time management. Students should allow sufficient time for research, drafting and the proper referencing of sources in preparing all assessment tasks.

Repeated plagiarism (even in first year), plagiarism after first year, or serious instances, may also be investigated under the Student Misconduct Procedures. The penalties under the procedures can include a reduction in marks, failing a course or for the most serious matters (like plagiarism in an honours thesis or contract cheating) even suspension from the university. The Student Misconduct Procedures are available here:

[www.gs.unsw.edu.au/policy/documents/studentmisconductprocedures.pdf](http://www.gs.unsw.edu.au/policy/documents/studentmisconductprocedures.pdf)

## Submission of Assessment Tasks

Work submitted late without an approved extension by the course coordinator or delegated authority is subject to a late penalty of five percent (5%) of the maximum mark possible for that assessment item, per calendar day.

The late penalty is applied per calendar day (including weekends and public holidays) that the assessment is overdue. There is no pro-rata of the late penalty for submissions made part way through a day. This is for all assessments where a penalty applies.

Work submitted after five days (120 hours) will not be accepted and a mark of zero will be awarded for that assessment item.

For some assessment items, a late penalty may not be appropriate. These will be clearly

indicated in the course outline, and such assessments will receive a mark of zero if not completed by the specified date. Examples include:

- Weekly online tests or laboratory work worth a small proportion of the subject mark;
- Exams, peer feedback and team evaluation surveys;
- Online quizzes where answers are released to students on completion;
- Professional assessment tasks, where the intention is to create an authentic assessment that has an absolute submission date; and,
- Pass/Fail assessment tasks.

## Faculty-specific Information

[Engineering Student Support Services](#) – The Nucleus - enrolment, progression checks, clash requests, course issues or program-related queries

[Engineering Industrial Training](#) – Industrial training questions

[UNSW Study Abroad](#) – study abroad student enquiries (for inbound students)

[UNSW Exchange](#) – student exchange enquiries (for inbound students)

[UNSW Future Students](#) – potential student enquiries e.g. admissions, fees, programs, credit transfer

## Phone

(+61 2) 9385 8500 – Nucleus Student Hub

(+61 2) 9385 7661 – Engineering Industrial Training

(+61 2) 9385 3179 – UNSW Study Abroad and UNSW Exchange (for inbound students)

## School Contact Information

CSE Help! - on the Ground Floor of K17

- For assistance with coursework assessments.

The Nucleus Student Hub - <https://nucleus.unsw.edu.au/en/contact-us>

- Course enrolment queries.

Grievance Officer - [grievance-officer@cse.unsw.edu.au](mailto:grievance-officer@cse.unsw.edu.au)

- If the course convenor gives an inadequate response to a query or when the course convenor does not respond to a query about assessment.

**Student Reps** - [stureps@cse.unsw.edu.au](mailto:stureps@cse.unsw.edu.au)

- If some aspect of a course needs urgent improvement. (e.g. Nobody responding to forum queries, cannot understand the lecturer)