Course Outline

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Course Details

Course Code	COMP9020
Course Title	Foundations of Computer Science
Units of Credit	6
Course Website	http://www.cse.unsw.edu.au/~cs9020
Handbook Entry	http://www.handbook.unsw.edu.au/postgraduate/courses/current/COMP9020.html

Course Summary

The official scope is: mathematical methods for designing correct and efficient programs; mathematics for algorithm analysis; logic for proving and verification.

The actual content is taken from a list of subjects that constitute the basis of the tool box of every serious practitioner of computing: set and relation theory; induction, recursion and recurrence relations; order of growth of functions; structured counting (combinatorics); discrete probability; graph theory and trees for algorithmic applications; propositional logic and boolean algebras.

Assumed Knowledge

None

Course Timetable

The course timetable is available here.

Course Aims and Student Learning Outcomes

After successfully completing this course, students will have developed an increased level of mathematical maturity to assist with the fundamental problem of

1. finding and formulating properties of programs, especially their correctness w.r.t. given requirements and specifications
2. analysing and proving properties of programs, in particular their correctness and runtime behaviour

Online quizzes, mid-term test and final exam will ensure that students have acquired this level of mathematical maturity.

This course contributes to the development of the following graduate capabilities:

Graduate Capability	Acquired in
Scholars capable of independent and collaborative enquiry, rigorous in their analysis, critique and reflection, and able to innovate by applying their knowledge and skills to the solution of novel as well as routine problems	lectures, in-class exercises, problem sets, quizzes
Professionals capable of ethical, self-directed practice and independent lifelong learning	problem sets, quizzes
Global citizens who are culturally adept and capable of respecting diversity and acting in a socially just and responsible way	interaction with your lecturer and fellow students

Teaching Strategies

- **Lectures** introduce concepts and show examples
- **Problem sets** reinforce concepts, provide additional examples and allow students to solve problems
- **Quizzes** allow students to demonstrate their problem-solving skills

Teaching Rationale

Lectures will include exercises where we examine the practice of formulating and proving mathematical properties of relevance to Computer Science. Problem sets and quizzes aim to deepen analysis and understanding via additional examples and problems.

Assessment

Component	Due	Maximum Mark
Quizzes	weeks 3, 5, 7, 9, 11, 13	20
Mid-term test	week 6 (Friday 13 April, 1-2pm)	20
Final Exam	exam period	60

Each quiz is worth 4 marks. Your total mark for the quizzes is computed by taking your 5 best quiz marks.

Your overall score will be the **maximum** of:

- quizzes + mid-term + final
- mid-term + 80*(final/60)
- quizzes + 80*(final/60)
- 100*(final/60)

In other words: *if you do better in the final exam, then the quizzes and/or your mid-term result will be ignored.*

To pass the course, your overall score must be 50 or higher **and** your mark for the final exam must be 25 or higher. If you meet both conditions, your overall score will be your mark for this course. Students who do not meet these requirements but achieve an overall score ≥47 can sit the supplementary exam, in which they have to achieve a mark ≥50 to pass with a final mark of 50.

Course Schedule

Numbers, Sets, Alphabets	week 1
Logic	week 2-3
Function theory	week 4
Public holiday	*week 5*
Mid-session test	**week 6** (45 mins)
Relation theory	week 6
Graph theory	week 7
Induction and recursion	week 8

Running time of programs	week 9
Counting, Probability, Expectation	week 10-12
Course revision	week 13

Student Conduct

The **Student Code of Conduct** (Information , Policy) sets out what the University expects from students as members of the UNSW community. As well as the learning, teaching and research environment, the University aims to provide an environment that enables students to achieve their full potential and to provide an experience consistent with the University's values and guiding principles. A condition of enrolment is that students *inform themselves* of the University's rules and policies affecting them, and conduct themselves accordingly.

In particular, students have the responsibility to observe standards of equity and respect in dealing with every member of the University community. This applies to all activities on UNSW premises and all external activities related to study and research. This includes behaviour in person as well as behaviour on social media, for example Facebook groups set up for the purpose of discussing UNSW courses or course work. Behaviour that is considered in breach of the Student Code Policy as discriminatory, sexually inappropriate, bullying, harassing, invading another one's privacy or causing any person to fear for their personal safety is serious misconduct and can lead to severe penalties, including suspension or exclusion from UNSW.

If you have any concerns, you may raise them with your lecturer, or approach the School Ethics Officer , Grievance Officer , or one of the student representatives.

Academic Honesty and Plagiarism

UNSW has an ongoing commitment to fostering a culture of learning informed by academic integrity. All UNSW staff and 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.

If you haven't done so yet, please take the time to read the full text of

- UNSW's policy regarding academic honesty and plagiarism

The pages below describe the policies and procedures in more detail:

- Student Code of Conduct Policy
- Plagiarism Policy Statement
- Plagiarism Procedure
- Student Misconduct Procedure

Resources for Students

The primary textbook associated with this course is

- [RW] KA Ross and CR Wright, *Discrete Mathematics,* 5th edition, Pearson, 2003.

This has been the recommended textbook for the course for the last 10 or more years. The following comprehensive lecture notes, which are from a similar course at MIT, provide supplementary material:

- [LLM] E Lehman, FT Leighton and A Meyer, *Mathematics for Computer Science,* Creative Commons 2015.

Course Evaluation and Development

This course is being continuously improved and we will conduct a survey through UNSW's myExperience process 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. Students are also encouraged to provide informal feedback during the session, and to notify the lecturer-in-charge of any problems as soon as they arise.

Student feedback from last offerings indicated that students were very satisfied with the course, but expressed an interest in more assessment components. This year we offer quizzes plus a mid-term test in addition to the final exam.

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