Course Outline

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Course Details

Course Code	COMP9020
Course Title	Foundations of Computer Science
Convenor	Paul Hunter (https://webcms3.cse.unsw.edu.au/users/z3520914)
Admin	Paul Hunter (https://webcms3.cse.unsw.edu.au/users/z3520914)
Classes	**Lectures** : Online • Mon 2pm-4pm, Weeks 1-3, 5-10 • Fri 11am-1pm, Weeks 1-10 There are **no tutorials** for this course.
Consultation	Online consultations • Tue 1pm-2pm • Thu 8pm-9pm
Units of Credit	6
Course Website	http://www.cse.unsw.edu.au/~cs9020 (http://www.cse.unsw.edu.au/%7Ecs9020)
Handbook Entry	http://www.handbook.unsw.edu.au/postgraduate/courses/current/COMP9020.html (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.

Course Timetable

The course timetable is available here (https://webcms3.cse.unsw.edu.au/COMP9020/21T3/timetable) (https://webcms3.cse.unsw.edu.au/COMP9020/20T2/timetable) (https://webcms3.cse.unsw.edu.au/COMP9020/21T3/timetable) .

Course Aims

After successfully completing this course, you will have developed an increased level of mathematical maturity to assist with the fundamental problem of *finding, formulating, and proving properties* of programs.

Assumed Knowledge

None, though students should be comfortable with basic algebraic manipulation up to, and including, working with logarithms.

Student Learning Outcomes

According to UNSW policy, graduate attributes *are important because the disciplinary knowledge that students develop at university is not adequate in itself as the basis for their future lives. Instead, graduates need qualities and skills that equip them for lifelong learning. These include critical thinking and problem-solving skills as well as communication skills and information literacy skills.*

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

Graduate Capability	**Acquired in**
scholarship: understanding of their discipline in its interdisciplinary context	lectures
scholarship: capable of independent and collaborative enquiry	quizzes, assignments
scholarship: rigorous in their analysis, critique, and reflection	in-class exercises, assignments
scholarship: able to apply their knowledge and skills to solving problems	quizzes, assignments
scholarship: capable of effective communication	forum
scholarship: information literate	lectures, quizzes, assignments
scholarship: digitally literate	lectures, quizzes
professionalism: capable of independent, self-directed practice	assignments, quizzes
professionalism: capable of operating within an agreed Code of Practice	all course-work, by doing it yourself
global citizens: culturally aware and capable of respecting diversity and acting in socially just/responsible ways	interaction with your fellow students

Teaching Rationale

Lectures will include exercises where we examine the practice of formulating and proving mathematical properties of relevance to Computer Science. Weekly quizzes 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 tutorials or laboratory classes for this subject.

Teaching Strategies

- **Lectures** introduce concepts and show examples
- **Quizzes** reinforce concepts, provide feedback for students to self-assess progress
- **Assignments** provide additional examples and allow students to solve problems

Quizzes are to be completed (on webcms) in the 48 hours before Monday's lecture (Friday in Week 4) and will cover the material of the previous two lectures. Assignments are due on Mondays of weeks 5, 8 and 11. Late submissions (for assignments) will be penalized at a rate of 10% per 12 hour period or part thereof. See also the section on Special Consideration (https://webcms3.cse.unsw.edu.au/COMP9020/20T3/resources/51831/edit#consideration) .

Student Conduct

The **Student Code of Conduct** (Information (https://student.unsw.edu.au/conduct) , Policy (https://www.gs.unsw.edu.au/policy/documents/studentcodepolicy.pdf)) 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'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 (mailto:ethics-officer@cse.unsw.edu.au) , Grievance Officer (mailto:grievance-officer@cse.unsw.edu.au) , or one of the student representatives (mailto:stureps.ug@cse.unsw.edu.au) .

Plagiarism is defined as (https://student.unsw.edu.au/plagiarism) using the words or ideas of others and presenting them as your own. UNSW and CSE treat plagiarism as academic misconduct, which means that it carries penalties as severe as being excluded from further study at UNSW. There are several on-line sources to help you understand what plagiarism is and how it is dealt with at UNSW:

- Plagiarism and Academic Integrity (https://student.unsw.edu.au/plagiarism)
- UNSW Plagiarism Procedure (https://www.gs.unsw.edu.au/policy/documents/plagiarismprocedure.pdf)

Make sure that you read and understand these. Ignorance is not accepted as an excuse for plagiarism. In particular, you are also responsible that your assignment files are not accessible by anyone but you by setting the correct permissions in your CSE directory and code repository, if using. Note also that plagiarism includes paying or asking another person to do a piece of work for you and then submitting it as your own work.

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 (https://student.unsw.edu.au/plagiarism)

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

- Student Code Policy (https://www.gs.unsw.edu.au/policy/documents/studentcodepolicy.pdf)
- Student Misconduct Procedure (https://www.gs.unsw.edu.au/policy/documents/studentmisconductprocedures.pdf)
- Plagiarism Policy Statement (https://www.gs.unsw.edu.au/policy/documents/plagiarismpolicy.pdf)
- Plagiarism Procedure (https://www.gs.unsw.edu.au/policy/documents/plagiarismprocedure.pdf)

You should also read the following page which describes your rights and responsibilities in the CSE context:

- Essential Advice for CSE Students (https://www.engineering.unsw.edu.au/computer-science-engineering/about-us/organisational-structure/student-services/policies/essential-advice-for-cse-students)

Special Consideration

If your work in this course is affected by unforeseen adverse circumstances, you should apply for Special Consideration through MyUNSW, including documentation on how your have been affected. If your request is reasonable and your work has clearly been impacted, then

- for an assignment, you may be granted an extension
- for the Final Exam, you may be offered a Supplementary Exam

Note the use of the word "may". None of the above is guaranteed. It depends on you making a convincing case that the circumstances have clearly impacted your ability to work.

If you are registered with Disability Services, please forward your documentation to Paul Hunter (mailto:pwhunter.work@gmail.com) within the first two weeks of semester.

Assessment

The final mark is determined as the sum of the marks for the assessible components for this course:

- 50% exam, 40% assignments, 10% quizzes:
  - 9 quizzes, worth up to 1.67 marks each
  - 3 assignments, worth 13.33 marks each
  - a final exam worth 50 marks
- Your final overall mark for this course will be taken from your *six best* quiz results, your assignment marks, and your final exam mark.
- To pass the course, you must achieve:
  - An overall score of 50 or higher, **AND**
  - At least 40% (20 marks) in the final exam.
- Please note the University's fit-to-sit policy (https://student.unsw.edu.au/special-consideration) - if you undertake an assessment then you are declaring yourself fit to do so. In particular, **further supplementary assessments are not available to students that have sat the final exam.**

Course Schedule

The following is a **tentative** schedule of when topics will be covered.

Week	**Topic**	Book chapters	**Quiz**	**Assignment**
1	Introduction to the course; Number theory	[LLM]: 1, 8		
2	Sets and Languages	[RW]: 1	Quiz 1 due	
3	Relations	[RW]: 3, 11 [LLM]: 4, 9, 13	Quiz 2 due	
4 (Fri only)	Functions	[RW]: 3, 11 [LLM]: 4, 9, 13	Quiz 3 due	
5	Graph theory	[RW]: 6 [LLM]: 11, 12	Quiz 4 due	Assignment 1 due
6	Recursion; Algorithm analysis	[RW]: 4, 7 [LLM]: 6, 21	Quiz 5 due	

7	Induction	[RW]: 4 [LLM]: 4, 6	Quiz 6 due	
8	Logic	[RW]: 10 [LLM]: 3	Quiz 7 due	Assignment 2 due
9	Counting; Probability	[RW]: 5 [LLM]: 14	Quiz 8 due	
10	Statistics; Revision	[RW]: 9 [LLM]: 16, 17	Quiz 9 due	
11				Assignment 3 due

Resources for Students

There is no compulsory textbook for this course, however, for more details on the topics covered in this course, it is recommended that students refer to the following books:

- [RW] KA Ross and CR Wright, *Discrete Mathematics,* (https://booko.com.au//9780130652478/Discrete-Mathematics) 5th edition, Pearson, 2003.
- [LLM] E Lehman, FT Leighton and A Meyer, *Mathematics for Computer Science,* (http://people.csail.mit.edu/meyer/mcs.pdf) Creative Commons 2015.

[RW] has been the recommended textbook for the course for the last 10 or more years and covers the fundamentals well. [LLM] covers the advanced topics excellently and provides numerous examples rooted in Computer Science.

Course Evaluation and Development

This course is evaluated each session using the myExperience system 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 quizzes and exercises. We will endeavour to achieve this in this offering.

UNSW and COVID-19

In line with the University guidance on COVID-19, all aspects of this course will be delivered online for Term 3, 2021. More information about the University's response can be found here (https://edtech.eng.unsw.edu.au/c19mess/comms.html) and here (https://www.covid-19.unsw.edu.au/safe-return-campus-faqs) .

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