COMP4141 Course Information for Session 1 2012

(The present document ($Revision: 1.4 $) is available online at
http://www.cse.unsw.edu.au/~cs4141/12s1/admin/outline.html).

Prerequisites and Follow-Ons

Prequisites: COMP2011 or COMP2711 or COMP2911 or MATH2301

After mastering this subject, students may want to follow on with an advanced algorithms subject (assuming that the basic one has been taken already), COMP3151 (Foundations of Concurrency), or any other subject that has a slightly theoretical slant.

Update Policy

This course introduction should be relatively stable at the beginning of session. Any updates after the initial publication in week one will be discussed in class and announced under the header **Fresh stuff** in the menu on the left hand side of the COMP4141 web site.

Course Overview by Keywords

Computability: formal languages and problems, Turing Machines (TMs), computability, (semi-)decidability, universal TMs, Church-Turing thesis, halting problem, reduction and undecidability proofs, examples; Complexity: run time, space, complexity classes, non-determinism and NP, polynomial reductions and NP completeness, optimisation problems and approximation, randomisation; Languages and Automata: regular expressions and languages, finite automata, determinisation, context-free grammars and languages (CFLs), Chomsky normal form, word problems, pumping lemma, push-down automata, decidability problems for CFLs; A brief overview of semantics and correctness: while programs, assertions and program correctness, Hoare logic, loops and loop invariants, relative completeness of Hoare logic (and its role in a proof of Gödel's incompleteness result).

Course Objectives

After successfully completing this course, you will appreciate the fundamental questions of computer science:

- What problems can be solved by a computation?
- How hard is it to compute solutions?
- How can we express computation?

You will also be aware of some concrete answers to these and related great questions of computer science, the reasons why some questions in this area will remain unanswered forever, and that some answers are still being sought.

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, communication skills, information literacy skills, and group work skills. says a UNSW policy.

- **Critical thinking and problem-solving skills** will be fostered a.o. through weekly homework sets and proof practice sessions.
- **Communication skills**, both oral and written, are sharpened by writing and presenting mathematical text for homework solutions and tutorials.
- **Group work skills** are developed while solving homework problems in pairs.

Course Evaluation and Development

I take student feedback seriously. I run my own more detailed online course surveys to find out what works and what doesn't. Fill ratios of these surveys tend to be much higher and feedback more detailed because students can score a bonus mark for filling in. Student feedback from previous sessions is available at the course website.

Consequences for 12s1:

- Avoid construction sites for lectures and tutes. (Writing that here is cheap. If it doesn't work out I can always try next year.)
- Adjust homework difficulty from `demotivating' to `challenging'. (A highly subjective measure.)
- Insist on a break during the Friday lectures.
- Publish tute questions no later than Wednesday so students have engouh time to ~~google~~solve them.

Keeping Informed and Staying in Touch

Course Web Site

Important notices related to this course will be displayed on the *course home page*, which is located at http://www.cse.unsw.edu.au/~cs4141/. It is your responsibility to check this page regularly.

Email

Only in rare cases urgent information may also be sent to your CSE email account.

Only requests of a confidential nature should be sent to the course account, cs4141. Anything else should go onto the message board described next. If in doubt, send email and be prepared to receive the one-line answer: *"This can be asked on the board."*

Message Board

A message board has been set up for this subject. All but the truly confidential questions should be posted there.

Course Calendar

All the dates of classes and deadlines related to this subject are maintained in an online calendar.

RSS Feed

Notifications about anything deemed noteworthy and related to this subject are maintained as an RSS feed. The newest items of that feed are also displayed first on the subject website.

Staff

Name	Role	email
Kai Engelhardt	lecturer-in-charge & tutor	kaie

Tutorials

Tutorials start in week two. Part of the allocated tutorial time will be devoted towards solving problems and discussing solutions related to lecture topics, while the remaining time will be used to discuss topics relevant to assignments.

Students will be required to present tutorial and/or homework problems (approx. 10 min/student) under the guidance of the tutor. Individual student contribution (presentation, critiquing solutions and suggesting alternatives) in tutorials will be assessed and forms part of the final mark for the course.

Note that tutorial marks will be based on participation only, there are no marks allocated just for attending.

[This part was originally copied from cs3231.]

Homework

Eleven homework problem sets will be published. Solutions are due in weeks 2 — 12. Students are allowed to work and submit in pairs. For the first time, we shall trial peer marking of some homework series.

Consultations

If you need the services of a consultant, come to Kai's office (217c in K17) on a Monday or Tuesday. Ring using the phone next to the glass door (x54497).

Text Book

The required textbook for this course is M Sipser, *Introduction to the Theory of Computation*, 2nd edition, Course Technology, 2005.

Additional notes are made available on the course website.

Assessment Summary

The final mark is determined as the sum of the marks for the assessable components and bonus marks of the course:

- 20% homework problems; submitted in pairs (distributed over 11 sets worth 2 marks each and due in weeks 2 — 12, resp.; the best 10 marks out of 11 are added up)
- 5% tutorial participation (subjective mark by your tutor)
- 75% exams:

    - a mid-session test (1 hour during the 2 hour lecture in week 6) worth up to 25 marks
    - a final exam (2 hours) worth up to 50 marks

  The exam mark e is the maximum of $m+f$ and $f * 1.5$, where m is the mid-session test mark and f is the final exam mark.
- 1 bonus mark for filling in an online course survey at the end of the session.

Hurdle requirement: your exam mark e must be a pass (at least 37.5/75) in order to pass the course.

Late Penalties

Late assignment submissions incur a (2% * maximum mark / hour) penalty for 1 day, after which submissions are no longer accepted. An otherwise perfect submission which is handed in 1 day and 1 second late will thus score 52% of the maximum mark.

Disclaimer

(Plagiarism, special considerations, supplementary exams)

Groups of up to two students are allowed to collabroate on the homework problems. Homework problems will be marked as group work, i.e. groups of one will be marked the same as groups of two. Both group members are expected to contribute equally. In submitting your homework, you are agreeing you have contributed equally unless we receive an agreed-to statement from both group members identifying differing levels of contribution.

All homework submissions are routinely submitted to plagiarism detection. Recall that you are bound by the Yellow Form. Particularly relevant are the sections on *Originality of Assignment Submissions*, *Special Consideration — Illness & Misadventure*, and the *CSE Supplementary Assessment Policy*.

CSE uses its addendum to the UNSW plagiarism policy.

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