

COMP1521 23T2 — Course Introduction

<https://www.cse.unsw.edu.au/~cs1521/23T2/>

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Most students in this course have completed

- COMP1511 or COMP1911

COMP1511 and COMP1911 covers *fundamental* C programming.

COMP1511 also covers topics, e.g. *linked lists*, *ADTs* not needed for COMP1521.

For this week's tuts and labs:

- review/strengthen assumed C knowledge
 - cover some small things not covered in COMP1511

Assumed Knowledge C knowledge

Assumed knowledge —

- design an algorithmic solution
- describe your solution in C code, using ...
 - variables, assignment, tests (`==`, `!`, `<=`, `&&`, etc)
 - `if`, `while`, `scanf()`, `printf()`
 - functions, `return`, prototypes, `*.h`, `*.c`
 - arrays, structs, pointers, `malloc()`, `free()`

Not assumed knowledge —

- linked structures, ADTs, sorting,
- *recursion, bit operations, file operations*
 - recursion and for loops will be mentioned in Week 1 tutorials

COMP1511/1911 ...

- gets you thinking like a *programmer*
- solving problems by developing programs
- expressing your solution in the C language

COMP1521 ...

- gets you thinking like a *systems programmer*
- with a deep understanding of run-time behaviour
- and better able to reason about your C programs

COMP1511/1911 ...



Figure 1: COMP1511/1911

COMP1521 ...



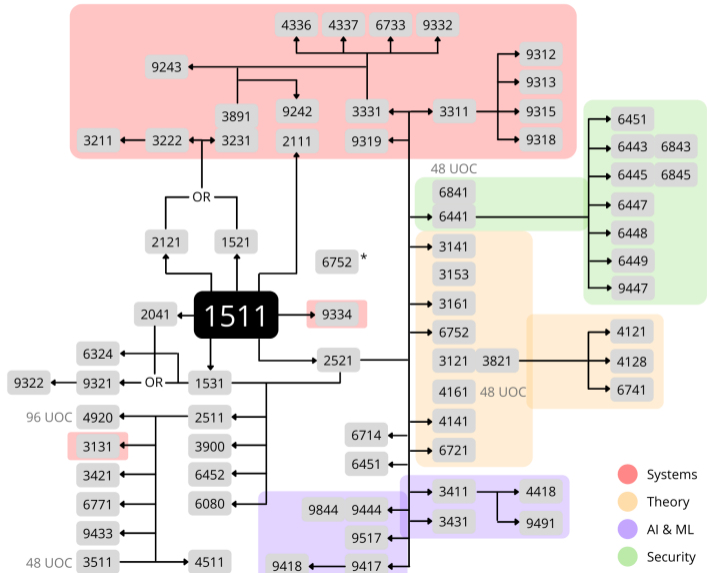
Figure 2: COMP1521

or maybe ...



Figure 3: COMP1521

Course Context



Major themes ...

- 1 software components of modern computer systems
- 2 how computer represent data including integers & floats & emoji 🍌
- 3 how C programs execute (at the machine level)
- 4 how to write (MIPS) assembly language
- 5 how operating systems are structured
- 6 Unix/Linux system-level programming particularly file operations
- 7 introduction to processes, thread and concurrency

Goal: you are able to understand execution of software in detail.

There is no prescribed textbook for COMP1521.

Recommended reference ...

Computer Systems: A Programmer's Perspective,

Bryant and O'Hallaron

- covers most topics, and quite well
- but uses a different machine code

Available in UNSW Bookshop

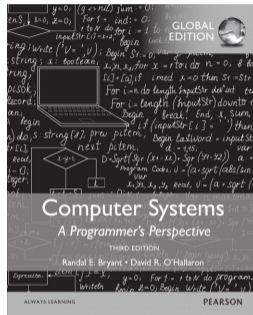


Figure 5: Computer Systems A Programmer's Perspective

Course Material has been drawn from

- *Introduction to Computing Systems:
from bits and gates to C and beyond,*
Patt and Patel
- *The Elements of Computer Systems:
Building a modern computer system from first principles,*
Nisan and Schocken
- COMP2121 Course Web Site, Parameswaran and Guo
- Past COMP1521 lecturers, admin, and tutors

Always give credit to your sources!

Prac work based on *Linux* tools

- all tools available on the *CSE lab machines* (Debian Linux)
- can use *VLAB* or *SSH* to connect to CSE from home

Compilers: `dcc` on CSE machines (`clang` or `gcc` elsewhere)

Assembly language: `mipsy` (`mipsy_web` online, `vscode` extension)

Use your own favourite text editor: `ed`, `vim`, `emacs`, `nano`, `gedit`, `vscode`, etc.

Other tools: `make`, `man`, `bc`, `perl`, `python3`, etc.

Learn to love the *shell* and *command-line* ... very useful!

- Monday, 09:00—11:00; Thursday, 11:00—13:00;
delivered in-person, starting week 1, and every week after (except week 6)
 - future lectures may have a live chat system
 - lectures recorded and linked from course home page.
 - King's Birthday means we miss a lecture on Monday week 3
 - We may hold the lecture at a different time, or pre-record it (TBA)
- present a brief overview of theory
- focus on practical demonstrations of coding
- demonstrate problem-solving (testing, debugging)
- lecture slides available on the web before lecture.
- may have guest lecturers ??

- COMP1521 has 3-hour tut-labs, starting week 1, and every week after (except week 6)
 - Our first tut-labs are immediately after this lecture
 - King's Birthday means a lot of people miss tutes on Monday week 3
 - An alternative time for your class will be arranged by your tutor
- 7 of our 30 classes are online
- delivered via Blackboard Collaborate (accessed via Moodle)
- the remaining timeslots are *face-to-face* classes
- please follow UNSW policy: <https://www.covid-19.unsw.edu.au/>

To get the best out of tutorials ...

- attempt the problems yourself beforehand
 - not marked, and no submission
 - but you will learn more if you try the problems yourself
- ask if you don't understand a question or how to solve it
- Do *not* keep quiet in tutorials: talk, discuss, ask question
- Your tutor may ask for your attempt to start a discussion.

Each tutorial is followed by a two-hour lab class.

- Several exercises, mostly small coding tasks
- Build skills needed for assignments, exam
- Done *individually*
- Submitted via `give`, before Monday 12:00 (midday)
- Automarked (with partial marks) — 15% of final mark
- Labs may include challenge exercises ...
 - may be silly, confusing, or impossibly difficult
 - almost full marks (95+%) possible *without* completing any challenge exercises

From week 3, and every week after (including week 6):

- released on Thursday 5pm (after the lecture)
- due exactly one week later
 - Submitted via give
- immediate reality-check on your progress.
- done in your own time under self-enforced *exam conditions*.
- time limit of 1 hour
 - can keep working after hour for 50% of mark
- automarked (with partial marks)
- best 6 of 8 tests contribute 10% of final mark
- any violation of test conditions
 - ⇒ zero for whole component

Assignments

- Ass1: Assembly (MIPS) Programming, weeks 3–5, 15%
- Ass2: C Systems Programming, weeks 7–9, 15%
- Assignments give you experience with larger programming problems than lab exercises
- Assignments will be carried out *individually*.
- They *always* take longer than you expect.
- Don't leave them to the last minute.
- Standard UNSW late penalties apply, 5% per day for 5 days, computed hourly.

CSE offers an inclusive learning environment for all students.

In anything connected to UNSW, including social media, these things are student misconduct and will not be tolerated:

- racist/sexist/offensive language or images
- sexually inappropriate behaviour
- bullying, harassing or aggressive behaviour
- invasion of privacy

Show respect to your fellow students and the course staff

Cheating of any kind constitutes academic misconduct and carries a range of penalties. Please read course intro for details.

Examples of inappropriate conduct:

- groupwork on individual assignments (discussion OK)
- allowing another student to copy your work
- getting your hacker cousin to code for you
- purchasing a solution to the assignment

- Labs, Tests, and Assignments must be entirely your own work.
- You can not work on labs, tests, or assignments as a pair or in a group.
- Plagiarism will be checked for and *penalized*.
- Plagiarism may result in suspension from UNSW.
- Scholarship students may lose scholarship.
- International students may lose visa.
- Supplying your work to any another person may result in loss of all your marks for the lab/assignment.

Use of Generative AI Tools

- Generative AI tools, e.g. GitHub Copilot, ChatGPT have great potential to assist coders
- Code they generate often has subtle errors & security vulnerabilities
 - also often generate poor code
- expert coders (hopefully) can spot these problems
- need a deep understanding of language/system to make good use of these tools
- COMP1521 students don't yet have this understanding
- Use of tools such as Copilot, ChatGPT may slow you getting this understanding
- Use of generative AI tools including github copilot, chatGPT not permitted in COMP1521
- later course will likely allow use of these tools

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- **in-person** 3-hour practical exam: in CSE labs, on CSE lab computers
 - You must be in Sydney to sit the exam during the exam period
- limited environment: you get the tools and software of a lab computer, not your own computer
 - You don't get access to your normal CSE account, so no custom configuration files
- may be some multiple-choice/short-answer questions, similar to tut questions.
- most questions will ask you to read C or assembler
- most marks for questions which ask you to write C or assembler
- also may ask you to answer written questions
- hurdle: you must score 18+/45 (40%) on the final exam to pass course

- 15% Labs
- 10% Tests
- 15% Assignment 1 — due start of week 7
- 15% Assignment 2 — due end of week 10
- 45% Final Exam

Above marks may be scaled to ensure an appropriate distribution

To pass, you must:

- score 50/100 overall
- score 18/45 on final exam

For example:

55/100 overall, 17/45 on final exam \Rightarrow **55 UF** not 55 PS

How to Pass this Course

- coding is a *skill* that improves with practice
- the more you practice, the easier you will find assignments/exams
- do the lab exercises
- do the assignments *yourself*
- practice programming outside classes
- treat extra tutorial questions like a mini prac exam