



<https://courseoutline.auckland.ac.nz/dco/course/COMPSCI/313/1215>

# COMPSCI 313 : Computer Architecture

## Science

2021 Semester Two (1215) (15 POINTS)

### Course Prescription

Modern processor architectures. Principles of modern processor design; pipelining; memory hierarchies; I/O and network interfacing; compiler and OS support; embedded processors; performance; multiprocessing.

### Course Overview

This course aims to provide students with an understanding of the principles of modern processor design and corresponding computing systems, including the knowledge of Assembly language; Processor architecture; Memory hierarchies and memory management; Performance Evaluation; Multiprocessing.

This course prepares students for the postgraduate course COMPSCI 711 (Parallel and Distributed Computing) or COMPSCI 701 (Special Topic) and any role in which they may need to assess competing options for computer hardware solutions, troubleshoot computer systems or choose elements to include in the design of a computer system.

### Course Requirements

Prerequisite: COMPSCI 210, 215, PHYSICS 140 Restriction: SOFTENG 363, COMPSYS 304

### Capabilities Developed in this Course

- Capability 1: Disciplinary Knowledge and Practice
- Capability 2: Critical Thinking
- Capability 3: Solution Seeking
- Capability 4: Communication and Engagement
- Capability 5: Independence and Integrity
- Capability 6: Social and Environmental Responsibilities

Graduate Profile: [Bachelor of Science](#)

## Learning Outcomes

By the end of this course, students will be able to:

1. Describe the basics of modern computer architectures and quantitative principles of computer design in order to develop a conceptual understanding of issues involved in designing a high performance computer system. (Capability 1)
2. Design and evaluate instruction set architectures (both RISC and CISC) and understand how they relate to the hardware/software interface in a computer system with a quick review in assembly programming. (Capability 2)
3. Analyse different processor implementation methods including the basic single-cycle implementation and how it can be extended to a multi-cycle, pipelined, and superscalar implementations. (Capability 1 and 3)
4. Work as a team to apply performance evaluation techniques and their relation to the target applications and the processor work load. (Capability 2 and 4)
5. Describe the memory hierarchy in a modern computer system and its impact on the performance of the system. This includes physical and virtual memory systems and basics of cache memories. (Capability 1)
6. Describe some basic principles of parallel computing as special topics in this course (more advanced materials for this part will be covered in a more advanced postgraduate level course). (Capability 1)
7. Use and apply this knowledge to select computers for specific tasks with considering the environmental responsibilities and integrity. This course will give students an understanding of the effects of design decisions on performance and help students become better-informed and considerate consumers in addition to a processor designer. (Capability 5 and 6)

## Assessments

Assessment Type	Percentage	Classification
Tutorials	10%	Individual Coursework
Assignments	20%	Individual Coursework
Project	10%	Individual Coursework
Test	20%	Individual Coursework
Final Exam	40%	Individual Coursework
5 types	100%	

Assessment Type	Learning Outcome Addressed						
	1	2	3	4	5	6	7
Tutorials	✓	✓	✓	✓	✓	✓	
Assignments	✓	✓	✓		✓	✓	
Project	✓			✓	✓		✓
Test	✓	✓	✓	✓	✓	✓	

Final Exam	✓	✓	✓	✓	✓	✓	
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### Special Requirements

There will be an open-book test and examination. A comprehensive reading of materials is needed.

A calculator is required in this course.

### Workload Expectations

This course is a standard **15-points** course and students are expected to spend **10 hours** per week involved in each **15-points** course that they are enrolled in.

For this course, you can expect **3-hours** of lectures, a **1-hour** tutorial, **4-hours** of reading and thinking about the content and **2-hours** of work on assignments and/or test preparation.

### Delivery Mode

#### Campus Experience

Lectures will be available as recordings. Other learning activities including tutorials will be available as recordings.

The course will not include live online events including group discussions/tutorials.

Attendance on campus is required for the test/exam. The course is available for students who are remote if the online test/exam will be setup.

The activities for the course are scheduled as a standard weekly timetable.

### Learning Resources

David Patterson and John Hennessy, Computer Organization and Design MIPS Edition, 6th edition, Morgan Kaufmann, 2020

### Student Feedback

During the course Class Representatives in each class can take feedback to the staff responsible for the course and staff-student consultative committees.

At the end of the course students will be invited to give feedback on the course and teaching through a tool called SET or Qualtrics. The lecturers and course co-ordinators will consider all feedback.

Your feedback helps to improve the course and its delivery for all students.

### Digital Resources

Course materials are made available in a learning and collaboration tool called Canvas which also includes reading lists and lecture recordings (where available).

Please remember that the recording of any class on a personal device requires the permission of the instructor.

### Academic Integrity

The University of Auckland will not tolerate cheating, or assisting others to cheat, and views cheating in coursework as a serious academic offence. The work that a student submits for grading must be the student's own work, reflecting their learning. Where work from other sources is used, it must be properly acknowledged and referenced. This requirement also applies to sources on the internet. A student's assessed work may be reviewed against online source material using computerised detection mechanisms.

### Copyright

The content and delivery of content in this course are protected by copyright. Material belonging to others may have been used in this course and copied by and solely for the educational purposes of the University under license.

You may copy the course content for the purposes of private study or research, but you may not upload onto any third party site, make a further copy or sell, alter or further reproduce or distribute any part of the course content to another person.

### Inclusive Learning

All students are asked to discuss any impairment related requirements privately, face to face and/or in written form with the course coordinator, lecturer or tutor.

Student Disability Services also provides support for students with a wide range of impairments, both visible and invisible, to succeed and excel at the University. For more information and contact details, please visit the [Student Disability Services' website](http://disability.auckland.ac.nz) <http://disability.auckland.ac.nz>

### Special Circumstances

If your ability to complete assessed coursework is affected by illness or other personal circumstances outside of your control, contact a member of teaching staff as soon as possible before the assessment is due.

If your personal circumstances significantly affect your performance, or preparation, for an exam or eligible written test, refer to the University's [aegrotat or compassionate consideration page](https://www.auckland.ac.nz/en/students/academic-information/exams-and-final-results/during-exams/aegrotat-and-compassionate-consideration.html) <https://www.auckland.ac.nz/en/students/academic-information/exams-and-final-results/during-exams/aegrotat-and-compassionate-consideration.html>.

This should be done as soon as possible and no later than seven days after the affected test or exam date.

## Learning Continuity

In the event of an unexpected disruption we undertake to maintain the continuity and standard of teaching and learning in all your courses throughout the year. If there are unexpected disruptions the University has contingency plans to ensure that access to your course continues and your assessment is fair, and not compromised. Some adjustments may need to be made in emergencies. You will be kept fully informed by your course co-ordinator, and if disruption occurs you should refer to the University Website for information about how to proceed.

Level 1: Delivered normally as specified in delivery mode

Level 2: You will not be required to attend in person. All teaching and assessment will have a remote option. The following activities will also have an on-campus/in-person option: (Lectures, tutorials, office hours )

Level 3 / 4: All teaching activities and assessments are delivered remotely

## Student Charter and Responsibilities

The Student Charter assumes and acknowledges that students are active participants in the learning process and that they have responsibilities to the institution and the international community of scholars. The University expects that students will act at all times in a way that demonstrates respect for the rights of other students and staff so that the learning environment is both safe and productive. For further information visit [Student Charter](https://www.auckland.ac.nz/en/students/forms-policies-and-guidelines/student-policies-and-guidelines/student-charter.html) <https://www.auckland.ac.nz/en/students/forms-policies-and-guidelines/student-policies-and-guidelines/student-charter.html>.

## Disclaimer

Elements of this outline may be subject to change. The latest information about the course will be available for enrolled students in Canvas.

In this course you may be asked to submit your coursework assessments digitally. The University reserves the right to conduct scheduled tests and examinations for this course online or through the use of computers or other electronic devices. Where tests or examinations are conducted online remote invigilation arrangements may be used. The final decision on the completion mode for a test or examination, and remote invigilation arrangements where applicable, will be advised to students at least 10 days prior to the scheduled date of the assessment, or in the case of an examination when the examination timetable is published.