UNSW Course Outline

COMP9211 Computer Architecture - 2024

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General Course Information

Course Code : COMP9211
Year : 2024
Term : Term 1
Teaching Period : T1
Is a multi-term course? : No
Faculty : Faculty of Engineering
Academic Unit : School of Computer Science and Engineering
Delivery Mode : Multimodal
Delivery Format : Standard
Delivery Location : Kensington
Campus : Sydney
Study Level : Postgraduate
Units of Credit : 6

Useful Links

Handbook Class Timetable

Course Details & Outcomes

Course Description

Computer architecture plays a crucial role in defining and bridging the interface between hardware and software in a computer system. It serves as the foundation upon which both hardware and software components are designed and interact with each other. A study of

computer architecture complements the study of programming language and algorithm, compiler, and operating system on the software side of the interface, and the study of embedded system, FPGA and VLSI design on the hardware side of the interface.

Course Aims

This course aims to provide students with a comprehensive understanding of computer system design, performance evaluation, and optimization. It equips students with the skills and knowledge necessary to tackle challenges in the field of computer architecture and prepares students for careers in areas such as computer engineering, computer science, and system design.

Course Learning Outcomes

Course Learning Outcomes
CLO1 : Demonstrate a deep understanding of computer hardware design, especially the pipelined RISC processor, hierarchical memory system, and multi-core processor system
CLO2 : Demonstrate ability to work in teams
CLO3 : Apply the basic design principles and techniques to build a processor to meet various requirements, such as performance, cost, power consumption
CLO4 : Use the simulation tool to investigate and validate the hardware design
CLO5 : Establish a solid background for studying and development of advanced computing systems

Course Learning Outcomes	Assessment Item
CLO1 : Demonstrate a deep understanding of computer hardware design, especially the pipelined RISC processor, hierarchical memory system, and multi-core processor system	• Tutorials - All topics • Final Exam - All topics
CLO2 : Demonstrate ability to work in teams	• Assignment - Processor Design
CLO3 : Apply the basic design principles and techniques to build a processor to meet various requirements, such as performance, cost, power consumption	• Labs - All topics • Assignment - Processor Design • Final Exam - All topics
CLO4 : Use the simulation tool to investigate and validate the hardware design	• Labs - All topics • Assignment - Processor Design
CLO5 : Establish a solid background for studying and development of advanced computing systems	• Tutorials - All topics • Labs - All topics • Final Exam - All topics • Assignment - Processor Design

Learning and Teaching Technologies

Moodle - Learning Management System | Webcms3 | Echo 360 | Microsoft Teams

Learning and Teaching in this course

- Lectures are used for introducing background materials, explaining motivations behind designs, drawing comparisons between competing architectures, connecting the current study with prior knowledge, illustrating avenues for extension to the presented materials, and guiding the direction of the course.
- Tutorials are intended to provide a forum for interaction and discussion. Tutorials will focus on the discussion of the design concepts and architectural/design issues. Problems will be made available to motivate the discussion.
- Labs are used for developing and exercising hardware design/description/simulation skills. Labs also provide a primary venue for group meetings and work collaborations.
- The group design project services as a signature assignment that encourages active, creative and collaborative learning.

Assessments

Assessment Structure

Assessment Item	Weight	Relevant Dates
Labs - All topics Assessment Format: Individual	20%	Start Date: To be given in each lab spec
Tutorials - All topics Assessment Format: Individual	10%	Start Date: Tut questions released on Thur. each week Due Date: Tut class the following week
Assignment - Processor Design Assessment Format: Group	20%	Start Date: Week 5 Due Date: Week 10
Final Exam - All topics Assessment Format: Individual	50%	Due Date: UNSW exam period

Assessment Details

Labs - All topics

Assessment Overview

For the lab work, peer assessments are basically used. Through he peer assessments, students can learn from each other and get feedback from peers and tutors. An assessment guide is given in the lab spec for each lab.

Course Learning Outcomes

- CLO3 : Apply the basic design principles and techniques to build a processor to meet various requirements, such as performance, cost, power consumption

- CLO4 : Use the simulation tool to investigate and validate the hardware design
- CLO5 : Establish a solid background for studying and development of advanced computing systems

Assignment submission Turnitin type

Not Applicable

Tutorials - All topics

Assessment Overview

The assessment is mainly based on the students' participation to the tutorials, both before and in the tutorial class.

Course Learning Outcomes

- CLO1 : Demonstrate a deep understanding of computer hardware design, especially the pipelined RISC processor, hierarchical memory system, and multi-core processor system
- CLO5 : Establish a solid background for studying and development of advanced computing systems

Assignment submission Turnitin type

Not Applicable

Assignment - Processor Design

Assessment Overview

The assignment is assessed in three parts: group presentation, lab demonstration, and project written report. Assessment criteria will be given in the assignment spec and feedback will be given by tutors.

Course Learning Outcomes

- CLO2 : Demonstrate ability to work in teams
- CLO3 : Apply the basic design principles and techniques to build a processor to meet various requirements, such as performance, cost, power consumption
- CLO4 : Use the simulation tool to investigate and validate the hardware design
- CLO5 : Establish a solid background for studying and development of advanced computing systems

Assignment submission Turnitin type

Not Applicable

Final Exam - All topics

Assessment Overview

It is a written exam, which covers all topics discussed in this course.

Course Learning Outcomes

- CLO1 : Demonstrate a deep understanding of computer hardware design, especially the pipelined RISC processor, hierarchical memory system, and multi-core processor system
- CLO3 : Apply the basic design principles and techniques to build a processor to meet various requirements, such as performance, cost, power consumption
- CLO5 : Establish a solid background for studying and development of advanced computing systems

Assessment Length

2 hrs

Assignment submission Turnitin type

Not Applicable

General Assessment Information

Grading Basis

Standard

Course Schedule

Teaching Week/Module	Activity Type	Content
Week 1 : 12 February - 18 February	Lecture	Course introduction ISA Single cycle processor
	Tutorial	Welcome
	Laboratory	Lab 1
Week 2 : 19 February - 25 February	Lecture	Processor performance Multi-cycle processor
	Tutorial	Tut 1
	Laboratory	Lab 1 assessment Lab 2
Week 3 : 26 February - 3 March	Lecture	Pipelining
	Tutorial	Tut 2
	Laboratory	Lab 2
Week 4 : 4 March - 10 March	Lecture	Pipelining
	Tutorial	Tut 3
	Laboratory	Lab 2 assessment Lab 3
Week 5 : 11 March - 17 March	Lecture	Memory hierarchy
	Tutorial	Tut 4
	Laboratory	Lab 3
Week 6 : 18 March - 24 March	Other	Flexible Week
Week 7 : 25 March - 31 March	Lecture	Memory hierarchy
	Tutorial	Tut 5
	Laboratory	Lab 3 assessment, Project work
Week 8 : 1 April - 7 April	Lecture	Parallel processing hardware
	Tutorial	Tut 6
	Laboratory	Project work
Week 9 : 8 April - 14 April	Lecture	Parallel processing hardware
	Tutorial	Tut 7
	Laboratory	Project work
Week 10 : 15 April - 21 April	Lecture	Course review
	Tut-Lab	Project assessment

Attendance Requirements

Students are strongly encouraged to attend all classes and review lecture recordings.

Course Resources

Recommended Resources

Texts and recommended readings:

- Textbook: Computer Organization and Design: The Hardware/Software Interface, D.A. Patterson and J.L. Hennessy, 5th Ed., Morgan Kaufmann, 2014
- Computer Architecture References:

- Computer Architecture: A Quantitative approach, J.L. Hennessy and D.A. Patterson
- Structured Computer Organisation, A.S. Tanenbaum, 5th Ed., Prentice-Hall.
- Computer Organization & Architecture: Designing for Performance, W. Stallings, 6th Ed., Prentice-Hall

Other resources: online on the Resources page of the course website.

Course Evaluation and Development

This course is evaluated each session using the myExperience system. Last year, we introduced a few changes to lectures, TLBs and assignment to encourage student participation. We will continue improve on these based on the students' feedback, such as the effectiveness of peer assessment.

Staff Details

Position	Name	Email	Location	Phone	Availability	Equitable Learning Services Contact	Primary Contact
Lecturer	Hui Guo		K17-501F		Wed. 11:00-12:00	Yes	Yes

Other Useful Information

Academic Information

I. Special consideration and supplementary assessment

If you have experienced an illness or misadventure beyond your control that will interfere with your assessment performance, you are eligible to apply for Special Consideration prior to, or within 3 working days of, submitting an assessment or sitting an exam.

Please note that UNSW has a Fit to Sit rule, which means that if you sit an exam, you are declaring yourself fit enough to do so and cannot later apply for Special Consideration.

For details of applying for Special Consideration and conditions for the award of supplementary assessment, please see the information on UNSW's Special Consideration page.

II. Administrative matters and links

All students are expected to read and be familiar with UNSW guidelines and polices. In particular, students should be familiar with the following:

- Attendance
- UNSW Email Address
- Special Consideration
- Exams
- Approved Calculators
- Academic Honesty and Plagiarism
- Equitable Learning Services

III. Equity and diversity

Those students who have a disability that requires some adjustment in their teaching or learning environment are encouraged to discuss their study needs with the course convener prior to, or at the commencement of, their course, or with the Equity Officer (Disability) in the Equitable Learning Services. Issues to be discussed may include access to materials, signers or note-takers, the provision of services and additional exam and assessment arrangements. Early notification is essential to enable any necessary adjustments to be made.

IV. Professional Outcomes and Program Design

Students are able to review the relevant professional outcomes and program designs for their streams by going to the following link: https://www.unsw.edu.au/engineering/student-life/student-resources/program-design.

Note: This course outline sets out the description of classes at the date the Course Outline is published. The nature of classes may change during the Term after the Course Outline is published. Moodle or your primary learning management system (LMS) should be consulted for the up-to-date class descriptions. If there is any inconsistency in the description of activities between the University timetable and the Course Outline/Moodle/LMS, the description in the Course Outline/Moodle/LMS applies.

Academic Honesty and Plagarism

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

Plagiarism is a type of intellectual theft. It can take many forms, from deliberate cheating to accidentally copying from a source without acknowledgement. UNSW has produced a website

with a wealth of resources to support students to understand and avoid plagiarism, visit: student.unsw.edu.au/plagiarism. The Learning Centre assists students with understanding academic integrity and how not to plagiarise. They also hold workshops and can help students one-on-one.

You are also reminded that careful time management is an important part of study and one of the identified causes of plagiarism is poor time management. Students should allow sufficient time for research, drafting and the proper referencing of sources in preparing all assessment tasks.

Repeated plagiarism (even in first year), plagiarism after first year, or serious instances, may also be investigated under the Student Misconduct Procedures. The penalties under the procedures can include a reduction in marks, failing a course or for the most serious matters (like plagiarism in an honours thesis or contract cheating) even suspension from the university. The Student Misconduct Procedures are available here:

www.gs.unsw.edu.au/policy/documents/studentmisconductprocedures.pdf

Submission of Assessment Tasks

Work submitted late without an approved extension by the course coordinator or delegated authority is subject to a late penalty of five percent (5%) of the maximum mark possible for that assessment item, per calendar day.

The late penalty is applied per calendar day (including weekends and public holidays) that the assessment is overdue. There is no pro-rata of the late penalty for submissions made part way through a day. This is for all assessments where a penalty applies.

Work submitted after five days (120 hours) will not be accepted and a mark of zero will be awarded for that assessment item.

For some assessment items, a late penalty may not be appropriate. These will be clearly indicated in the course outline, and such assessments will receive a mark of zero if not completed by the specified date. Examples include:

- Weekly online tests or laboratory work worth a small proportion of the subject mark;
- Exams, peer feedback and team evaluation surveys;
- Online quizzes where answers are released to students on completion;
- Professional assessment tasks, where the intention is to create an authentic assessment that

has an absolute submission date; and,
- Pass/Fail assessment tasks.

Faculty-specific Information

Engineering Student Support Services – The Nucleus - enrolment, progression checks, clash requests, course issues or program-related queries

Engineering Industrial Training – Industrial training questions

UNSW Study Abroad – study abroad student enquiries (for inbound students)

UNSW Exchange – student exchange enquiries (for inbound students)

UNSW Future Students – potential student enquiries e.g. admissions, fees, programs, credit transfer

Phone

(+61 2) 9385 8500 – Nucleus Student Hub

(+61 2) 9385 7661 – Engineering Industrial Training

(+61 2) 9385 3179 – UNSW Study Abroad and UNSW Exchange (for inbound students)

School Contact Information

CSE Help! - on the Ground Floor of K17

- For assistance with coursework assessments.

The Nucleus Student Hub - https://nucleus.unsw.edu.au/en/contact-us

- Course enrolment queries.

Grievance Officer - grievance-officer@cse.unsw.edu.au

- If the course convenor gives an inadequate response to a query or when the course convenor does not respond to a query about assessment.

Student Reps - stureps@cse.unsw.edu.au

- If some aspect of a course needs urgent improvement. (e.g. Nobody responding to forum

queries, cannot understand the lecturer)