Course Outline

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Course Details

Course Code	COMP3211
Course Title	Computer Architecture
Convenor	Hui Guo (/users/z3068443)
Admin	Hui Guo (/users/z3068443)
Classes	**Lectures** : Wed. 9:00-11:00, Ainswth 102 Thu. 13:00-14:00, Ainswth 202 Timetable for all classes (/COMP3211/18s1/timetable)
Consultations	Hui Guo, K17-501F, Ext 57136
Units of Credit	6
Course Website	http://cse.unsw.edu.au/~cs3211/18s1/ (http://cse.unsw.edu.au/~cs3211/18s1/)
Handbook Entry	http://www.handbook.unsw.edu.au/undergraduate/courses/current/COMP3211.html (http://www.handbook.unsw.edu.au/undergraduate/courses/current/COMP3211.html)

Course Summary

This course is about the design and implementation of the interface between the software and hardware layers of computer systems.

A study of computer architecture complements the study of programming languages and algorithms, compilers, and operating systems on the software side of the interface, as well as embedded systems, FPGA and VLSI design on the hardware side of the interface **.**

Assumed Knowledge

Before commencing this course, students should:

- know digital circuits design and be able to model a hardware design with VHDL;
- understand microprocessor operations and assembly programming.

These are assumed to have been acquired in COMP2121 and COMP3222.

Student Learning Outcomes

After completing this course, students will:

1. develop a deep understanding of computer systems design, especially the pipelined RISC machine and hierarchical memory system.
2. understand the basic design principles and techniques for performance improvements
3. be able to use simulation tools to validate designs, and
4. gain professional skills in project design, management, and communication.

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

Graduate Capability	**Acquired in**
Scholars capable of independent and collaborative enquiry, rigorous in their analysis, critique and reflection, and able to innovate by applying their knowledge and skills to the solution of novel as well as routine problems	project design, lab, tutorial
Entrepreneurial leaders capable of initiating and embracing innovation and change, as well as engaging and enabling others to contribute to change	project design
Professionals capable of ethical, self- directed practice and independent lifelong learning	project design, lab, tutorial
Global citizens who are culturally adept and capable of respecting diversity and acting in a socially just and responsible way	project design, lab, tutorial, and lecture

Teaching Strategies

- Lectures will be used for presenting the background material, explaining the motivation behind designs, drawing comparisons between competing architectures, connecting material with prior knowledge, illustrating avenues for extension to the presented material, 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 design concepts and one or two architectural/design issues. Problems will be made available to motivate the discussion. Tutorials will also be used for project presentations and evaluation. All tutorial participants will be engaged in assessing the project work and presentations of others.
- Labs provide a venue for developing and exercising design, description, and simulation skills. They are the primary venue for group meetings and work. You will be expected to build on provided code and gain proficiency at gathering and interpreting simulation results.
- In this course you will work on a major project. You need to present your design in your tute/lab class block and submit a final project report.

Teaching Rationale

We have a lot to cover in engineering study: understanding scientific theory, learning how to apply theory to design, developing designs, implementing and testing designs, and gaining an appreciation for professional issues. Through lectures, lab exercises, tutorials and project design, we can integrate these in our course.

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.

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)

Assessment

- A 1-hour quiz in the lecture class on Wednesday, April 11 (Week 6), worth 20% of your final mark and covering materials addressed in the first five weeks.
- A 2-hour exam, worth 40% of your final mark at the conclusion of the course on all materials. You must obtain at least 40% of the available marks in the final exam in order to pass the course.
- Project work, worth 30% of the final mark in this course.
- Lab performance (including participation), worth 10% of the final mark.

Course Schedule

Week	Event	Topic
1	Lectures start Lab 1 released	Course Intro, ISA Design Single Cycle Processor
2	Tutes/Labs start	Single Cycle Processor Performance
3	Pipelined Processor	
4	Lab 1 due Project groups formed Project part 1 released	Pipelined Processor
5	Project part 1 work	Memory Technology Memory Hierarchy
6	Project part 1 work Quiz	Cache
7	Project part 1 work	Bus
8	Project Part 1 group presentation Project part 2 released	Multiprocessor
9	Project part 2 work	Extended Topics
10	Project part 2 work	Extended Topics
11	Project part 2 work	Advanced Topics
12	Project part 2 group presentation Group project report due	Advanced Topics Course Review

Resources for Students

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, 2006.
  - Computer Organization & Architecture: Designing for Performance, W. Stallings, 6th Ed., Prentice-Hall, 2003.
  - Computer Organization, C. Hamacher, Z. Vranesic, and S. Zaky, 5th Ed., McGraw Hill, 2002. o Digital Design: Principles and Practices, J.F. Wakerly, 3rd Ed., Prentice-Hall, 2001.
- VHDL References:

Course Evaluation and Development

This course is evaluated each session using the myExperience system.

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Comments

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