

Computer Organisation - Course Outline

NWEN 242: 2016 Trimester 2

This document sets out the workload and assessment requirements for NWEN 242. It also provides contact information for staff involved in the course. If the contents of this document are altered during the course, you will be advised of the change by an announcement in lectures and/or on the course web site. A printed copy of this document is held in the School Office.

Objectives

NWEN242 introduces the common physical components of a computer and their interconnection. It also studies the process of program execution, the fundamentals of assembly language programming, data representation, computer arithmetic, and machine instruction design. This course focuses on the boundary between hardware and software and explores the levels of hardware in the vicinity of this boundary. The first part of the course considers the concepts of assembly language programming, data representation and computer arithmetic. The second part considers datapath, control, pipelining, memories, and interface between processors and peripherals. The purpose of the course is to give you an overall understanding of how the technologies that we use to build computers influence the design of the programming languages and the efficiency of the algorithms that we use on them. By the end of the course you should be able to demonstrate a good understanding of:

1. Main components of a typical computer and their interconnections,
2. Appropriate ways to represent data in hardware,
3. Writing simple and understanding more complex MIPS assembly language programs,
4. The way a computer executes arithmetic operations,
5. Logic designs for:
 - Performing computations (datapaths),
 - Controlling datapaths,
 - Storing information (memories), and
 - Improving datapaths and memory performance (pipelining and caches).
6. How these designs influence:
 - The basic operations available to programmers, and
 - The performance of computer programs.

The objectives 1, 2, 3, and 4 demonstrate the ability to apply mathematical and engineering sciences to gain understanding of a complex engineering problem ([BE graduate attribute 3\(a\)](#)). The objective 5 develops competence in design of computer system, ability to demonstrate their efficacy, and understanding of the limitations of computer system design methods ([BE graduate attribute 3\(f\)](#), [BE graduate attribute 3\(b\)](#), and ([BE graduate attribute 3\(d\)](#)), respectively. The objective 6 develops ability to solve models that predict behaviour of a computer system ([BE graduate attribute 3\(c\)](#)).

Textbook

The textbook for NWEN 242 is: Patterson and Hennessy *Computer Organization and Design - The Hardware/Software Interface*, (Fifth Edition), Morgan Kaufmann. Information about the textbook is available [here](#)

Lectures, Tutorials, Laboratories, and Practical work

A [schedule](#) of lecture topics, readings, and assignment due dates is available online

Lectures for NWEN 242 are:

Week 1-3

Day	Time	Room
Wednesday	1200-1250	Hugh Mackenzie LT002
Thursday	1200-1250	Hugh Mackenzie LT002

Week 4-12

Day	Time	Room
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Tuesday	1200-1250	Hugh Mackenzie LT002
Wednesday	1200-1250	Hugh Mackenzie LT002

Lectures will introduce and discuss the main concepts and theories, while tutorials will help you review the topics and issues discussed in lectures and understand how the concepts and theories can be applied.

Ad-hoc tutorials (only when scheduled) are:

Day	Time	Room
Thursday	1200-1250	Hugh Mackenzie LT002

Helpdesk/Lab sessions (starting from Week 2) are:

Day	Time	Room
Tuesday	1300-1500	CO246
Thursday	1000-1200	CO246

No signup for Helpdesk sessions. Lab project starts from Week 2.

Assignments and Projects

There will be FOUR (4) homework assignments and THREE (3) lab projects for this course. Homework assignments and lab projects will enable you to practice concepts and theories introduced in lectures. They are an important part of your preparation for the final exam. You will find submission instruction in the homework page and in the description of each lab project when they become available.

You are expected to do all the lab projects and all the homework assignments. Each lab project is worth 10% of your final grade. Each homework assignment is worth 2.5% of your final grade. The objective of each lab project is given below:

- Lab project 1: the objective of this lab is for students to become familiar with assembly programming.
- Lab project 2: the objective of this lab is to test students' understanding of pipeline datapath operation and hazards.
- Lab project 3: the objective of this lab is to enhance students' understanding of caches and memory management in a computer system.

Workload

In order to maintain satisfactory progress in NWEN 242, you should plan to spend an average of **10** hours per week on this paper. A plausible and approximate breakdown for these hours would be:

- Lectures and tutorials: 2-3 hours
- Independent study: 3 hours
- Homework assignments: 1 hours
- Lab projects: 3 hours

School of Engineering and Computer Science

The School office is located on level three of the Cotton Building (Cotton 358).

Staff

The course coordinator for NWEN 242 is Qiang Fu. The lecturers for NWEN 242 are Matthew Stevens and Qiang Fu. Their contact details are:

- Matthew Stevens
- AM 401
- Matthew.Stevens@ecs.vuw.ac.nz
- Office Hours: 1~4pm, Wed. (Weeks1~6)

- Qiang Fu
- AM 414
- +64 4 463 5233 x8829
- qiang.fu@ecs.vuw.ac.nz
- Office Hours: 1~4pm, Wed. (Weeks7~12)

Tutors for NWEN 242 are:

- Abigail Koay
- Iris Riddiford Graham
- Robert Johnston
- Shenbo Xuan
- Mayur Panchal

Class representative:

- Bohua Ruan
- Sami Habib

Announcements and Communication

The main means of communication outside of lectures will be the NWEN 242 web area at http://ecs.victoria.ac.nz/Courses/NWEN242_2016T2/. There you will find, among other things, this document, the [lecture schedule](#), [homework assignments](#), [lab projects](#), and the [NWEN 242 Forum](#). The forum is a web-based bulletin board system. Questions and comments can be posted to the forum, and staff will read these posts and frequently respond to them.

Assessment

Your grade for NWEN 242 will be determined based on the following assessment weightings:

Item	Weight	Due	Learning objectives
Homework Assignment 1	2.5%	Wed., Week 4 (Midnight 3 August)	1, 2, 3, 6
Homework Assignment 2	2.5%	Wed., Week 6 (Midnight 17 August)	3, 4, 5, 6
Homework Assignment 3	2.5%	Wed., Week 9 (Midnight 21 September)	5, 6
Homework Assignment 4	2.5%	Wed., Week 11 (Midnight 5 October)	5, 6
Lab Project 1	10%	Fri., Week 5 (Midnight 12 August)	2, 3
Lab Project 2	10%	Fri., Week 10 (Midnight 30 September)	5, 6
Lab Project 3	10%	Fri., Week 12 (Midnight 14 October)	5, 6
Final Examination	60%		1, 2, 3, 4, 5, 6

You are expected to do all the assignments/labs.

The policy on late submission is as follows:

Homework Assignments

- Model solutions to the assignments will be released shortly after the assignment deadline. This means late submissions will NOT be accepted, unless you have made prior arrangement with the course coordinator for valid reasons such as medical and family emergencies.

Lab Projects

- Each lab project that is late (ie, submitted on the submission system after the deadline) will be penalised by 20% if it is up to 24 hours late, and penalised by 40% if it is between 24 hours and 48 hours late. Any work submitted more than 48 hours after the deadline **will receive 0 marks**.
- Each student will have 3 "late days" which you may choose to use for any lab project(s) during the course. There will be no penalty applied for these late days. You do not need to apply for these - any late days you have left will be automatically applied to lab projects that you submit late.
- The late days are intended to cover minor illnesses or other personal reasons for being late. You should only ask for extensions in the case of more significant or longer lasting problems (and you may need documentation). Do not waste "late days" on procrastination!

Note: Bachelor of Engineering students should be aware that copies of their assessed work may be retained for inspection by accreditation panel.

Tests and Exams

The final examination will be **TWO** hours long. You may be asked questions about any of the topics that we have covered in lectures and tutorials (this corresponds, roughly, to Chapters 1 to 5 and Appendices B-2 of the fifth edition of the course textbook), or in homework assignments and lab projects.

The timetable for final examinations will be available from the University web site and will be posted on a notice board outside the faculty office. No computers, electronic calculators or similar device will be allowed in the final examination. Paper non-English to English dictionaries will be permitted. The examination period for trimester 2 is 21 October - 12 November.

Plagiarism

Working Together and Plagiarism

We encourage you to discuss the principles of the course and assignments with other students, to help and seek help with programming details, problems involving the lab machines. However, any work you hand in must be your own work.

The School policy on Plagiarism (claiming other people's work as your own) is available from the course home page. Please read it. We will penalise anyone we find plagiarising, whether from students currently doing the course, or from other sources. Students who knowingly allow other students to copy their work may also be penalised. If you have had help from someone else (other than a tutor), it is always safe to state the help that you got. For example, if you had help from someone else in writing a component of your code, it is not plagiarism as long as you state (eg, as a comment in the code) who helped you in writing the method.

Mandatory Course Requirements

1. You must obtain at least a D grade in the final examination.
2. You must attempt all lab projects.

Any student who is concerned that they have been (or might be) unable to meet any of the MCRs because of exceptional personal circumstances, should contact the course coordinator as soon as possible.

Passing NWEN 242

To pass NWEN 242, a student must satisfy mandatory requirements and gain at least a **C-** grade overall.

Withdrawal

The last date for withdrawal from NWEN 242 with entitlement to a refund of tuition fees is Friday 22 July 2016. The last date for withdrawal without being regarded as having failed the course is Friday 23 September 2016 -- though later withdrawals may be approved by the Dean in special circumstances.

Rules & Policies

Find key dates, explanations of grades and other useful information at <http://www.victoria.ac.nz/home/study>.

Find out about academic progress and restricted enrolment at <http://www.victoria.ac.nz/home/study/academic-progress>.

The University's statutes and policies are available at <http://www.victoria.ac.nz/home/about/policy>, except qualification statutes, which are available via the Calendar webpage at <http://www.victoria.ac.nz/home/study/calendar> (See Section C).

Further information about the University's academic processes can be found on the website of the Assistant Vice-Chancellor (Academic) at <http://www.victoria.ac.nz/home/about/avcacademic>

All students are expected to be familiar with the following regulations and policies, which are available from the school web site:

[Grievances](#)

[Student and Staff Conduct](#)

[Meeting the Needs of Students with Disabilities](#)

[Student Support](#)

[Academic Integrity and Plagiarism](#)

[Dates and Deadlines including Withdrawal dates](#)

[School Laboratory Hours and Rules](#)

[Printing Allocations](#)

[Expectations of Students in ECS courses](#)

The School of Engineering and Computer Science strives to anticipate all problems associated with its courses, laboratories and equipment. We hope you will find that your courses meet your expectations of a quality learning experience.

If you think we have overlooked something or would like to make a suggestion feel free to talk to your course organiser or lecturer.

