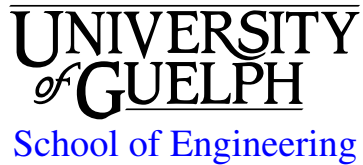


ENGG*3380 Computer Organization and Design

Winter 2014



(Revision 0: Nov. 29, 2014)

1 INSTRUCTIONAL SUPPORT

1.1 Instructor

Instructor: Medhat Moussa, Ph.D., P.Eng.
Office: THRN 1339, ext. 52435
Email: mmoussa@uoguelph.ca
Office hours: TBA on Courselink or by appointment

1.2 Lab Technician

Technician: Nate Groendyk
Office: THRN 2308, ext. 53873
Email: groendy@uoguelph.ca

1.3 Teaching Assistants

GTA	Email	Office Hours
TBA	sbody@uoguelph.ca	TBA on Courselink

2 LEARNING RESOURCES

2.1 Course Website

Course material, news, announcements, and grades will be regularly posted to the ENGG*3380 [Courselink](#) site. You are responsible for checking the site regularly.

2.2 Required Resources

1. D. A. Patterson and J.L. Hennessy, *Computer Organization and Design: The hardware/software interface*, 5th Edition, Morgan Kaufmann, 2014.

2.3 Additional Resources

Lectures will also include materials covered in the following texts for microprocessor design and implementation

1. C. Hamacher, Z. Vranesic, S. Zaky, *Computer Organization*, 5th Edition, McGraw Hill
2. J. Carpinelli, *Computer Systems Organization and Architecture*, Addison Wesley

You may also find the following resources helpful for the lab component.

1. K. Short, *VHDL for Engineers*, 2nd Edition, Prentice Hall, 2008.
2. VHDL Tutorial by Shawki Areibi

2.4 Additional Resources

Lecture Information: All the lecture notes are posted on the web page (week #1-#12).

Lab Information: The handouts for all the lab sessions are within the lab section. All types of resources regarding tutorials, links to web pages can be found in this section.

Assignments: Download the assignments according to the schedule given in this handout.

2.5 Communication and Email Policy

Please use lectures and lab help sessions as your main opportunity to ask questions about the course. Major announcements will be posted to the course website. It is your responsibility to check the course website regularly. As per university regulations, all students are required to check their juoguelph.ca e-mail account regularly: e-mail is the official route of communication between the University and its students.

3 ASSESSMENT

3.1 Dates and Distribution

Labs and assignment: 15%

Project: 40%

Final Exam: 45%

3.2 Course Grading Policies

Missed Assessments: If you are unable to meet an in-course requirement due to medical, psychological, or compassionate reasons, please email the course instructor. See the undergraduate calendar for information on regulations and procedures for Academic Consideration:

<http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-ac.shtml>

Accommodation of Religious Obligations: If you are unable to meet an in-course requirement due to religious obligations, please email the course instructor within two weeks of the start of the semester to make alternate arrangements. See the undergraduate calendar for information on regulations and procedures for Academic Consideration of Religious Obligations:

<http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-accomrelig.shtml>

Passing grade: The passing grade in this course is 50%

Lab Work: You must attend and complete all laboratories. If you miss a laboratory due to grounds for granting academic consideration or religious accommodation, arrangements must be made with the teaching assistant to complete a makeup lab.

Late Lab Reports: Late submissions of lab reports will be subject to the following penalty policy.

- 25% will be deducted if the report is up to 24 hours late,
- 50% will be deducted if the report is 24 to 48 hours late,
- No reports will be accepted after 48 hours of the due date.

4 AIMS, OBJECTIVES & GRADUATE ATTRIBUTES

4.1 Calendar Description

This course provides detailed examination of modern computer organization and techniques for microprocessor architecture design. Topics include - CPU design; instruction set design, addressing modes, operands; data flow design: internal bus structure, data flow signals, registers; control sequence design: hardwired control, decoding, microprogramming; architecture classes: CISC, RISC, and DSP; Memory organization; performance. Students must complete a term project that includes design, implementation, and demonstration of a CPU using a hardware descriptive language like VHDL.

Prerequisite(s): ENGG*2410

4.2 Course Aims

This course links several of the core courses in the Engineering Systems and Computing program (ENGG 2410, ENGG 3640, and CIS 3110) to provide a complete picture of how an electronics system that is composed of millions of transistors becomes a computing machine that can be used in a wide range of tasks. This course explore the hardware/software interface and study how modern computers are designed and evaluated.

4.3 Learning Objectives

At the successful completion of this course, the student will have demonstrated the ability to:

1. Thoroughly understand computer organization and the impact of various components on performance.
2. Evaluate computer performance
3. Design an instruction set to target a particular class of applications
4. Design a microprocessor including datapath and control unit
5. Analyze pipelining designs.
6. Analyze memory management designs.

4.4 Graduate Attributes

Successfully completing this course will contribute to the following CEAB Graduate Attributes:

Graduate Attribute	Learning Objectives	Assessment
1. Knowledge Base for Engineering	1, 2, 5, 6	Assignment, Exams
2. Problem Analysis	2, 5, 6	Assignment, Exams, Project
3. Investigation	-	
4. Design	3, 4	Labs, Project
5. Use of Engineering Tools		Labs, Project
6. Communication	-	-
7. Individual and Teamwork	-	-
8. Professionalism	-	-
9. Impact of Engineering on Society and the Environment	-	-
10. Ethics and Equity	-	-
11. Environment, Society, Business, & Project Management	-	-
12. Life-Long Learning		Project

4.5 Instructor's Role and Responsibility to Students

The instructor's role is to develop and deliver course material in ways that facilitate learning for a variety of students. Selected lecture notes will be made available to students on CourseLink/D2L but these are not intended to be stand-alone course notes. During lectures, the instructor will expand and explain the content of notes and provide example problems that supplement posted notes. Scheduled classes will be the principal venue to provide information and feedback for tests and project.

4.6 Students' Learning Responsibilities

Students are expected to take advantage of the learning opportunities provided during lectures and tutorials. Students, especially those having difficulty with the course content, should also make use of other resources recommended by the instructor. Students who do (or may) fall behind due to illness, work, or extra-curricular

activities are advised to keep the instructor informed. This will allow the instructor to recommend extra resources in a timely manner and/or provide consideration if appropriate.

4.7 Relationships with other Courses & Labs

Previous Courses:

ENGG*2410: Mechanical system fundamentals such as force, torques, friction, moments, free body diagrams

Follow-on Courses:

ENGG*3410: Foundations of systems analysis, frequency response

5 TEACHING AND LEARNING ACTIVITIES

5.1 Timetable

Lectures:

Tuesday, Thursday 1:00PM - 02:20PM MACK 223

Laboratory:

Friday 02:30PM - 04:20PM RICH 1532

5.2 Lecture Schedule

Lectures	Lecture Topics	References	Learning Objectives
1-2	Review of Technology Trends and Cost/Performance	Patterson (Ch.1)	1,2
3-6	Instruction Set Architecture	Patterson(Ch.2)	3
7-8	CPU Design, Datapath	Hamacher (Ch.9); Carpinelli (Ch.6)	4
9-12	CPU Design, Control	(Hamacher, Ch.9)	4
13-21	Pipelining	(Patterson (Ch.4)	5
12-24	Memory hierarchy	(Patterson (Ch.5)	6

5.3 Other Important Dates

Monday, January 6 2014: First day of class Monday, February 17 - Friday, February 21 2014: Winter Break
 Friday, March 7: drop date - 40th class Friday, April 4 2014: last day of class

6 LAB SAFETY

Safety is critically important to the School and is the responsibility of all members of the School: faculty, staff and students. As a student in a lab course you are responsible for taking all reasonable safety precautions and following the lab safety rules specific to the lab you are working in. In addition, you are responsible for reporting all safety issues to the laboratory supervisor, GTA or faculty responsible.

If the laboratory rules are not followed, consequences will include removing access to the lab. If this results in lab work not being completed, the student will receive a grade of 0.

7 ACADEMIC MISCONDUCT

The University of Guelph is committed to upholding the highest standards of academic integrity and it is the responsibility of all members of the University community faculty, staff, and students to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offenses from occurring. University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff and students have the responsibility of supporting an environment that discourages misconduct. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection.

Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member.

7.1 Resources

The Academic Misconduct Policy is detailed in the Undergraduate Calendar:

<http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-amisconduct.shtml>

A tutorial on Academic Misconduct produced by the Learning Commons can be found at:

<http://www.academicintegrity.uoguelph.ca/>

Please also review the section on Academic Misconduct in your [Engineering Program Guide](#).

The School of Engineering has adopted a Code of Ethics that can be found at:

<http://www.uoguelph.ca/engineering/undergrad-counselling-ethics>

8 ACCESSIBILITY

The University of Guelph is committed to creating a barrier-free environment. Providing services for students is a shared responsibility among students, faculty and administrators. This relationship is based on respect of individual rights, the dignity of the individual and the University community's shared commitment to an open and supportive learning environment. Students requiring service or accommodation, whether due to an identified, ongoing disability for a short-term disability should contact the Centre for Students with Disabilities as soon as possible

For more information, contact CSD at 519-824-4120 ext. 56208 or email csd@uoguelph.ca or see the website: <http://www.uoguelph.ca/csd/>

9 RECORDING OF MATERIALS

Presentations which are made in relation to course work-including lectures-cannot be recorded or copied without the permission of the presenter, whether the instructor, classmate or guest lecturer. Material recorded with permission is restricted to use for that course unless further permission is granted.

10 RESOURCES

The Academic Calendars are the source of information about the University of Guelph's procedures, policies and regulations which apply to undergraduate, graduate and diploma programs:

<http://www.uoguelph.ca/registrar/calendars/index.cfm?index>