Trent University
Computer Science 230H
2007 Fall Term

COMPUTER ORGANIZATION

Course Outline

Instructor: Michael Jack, *E-mail: michaeljack@trentu.ca*
Office: OC 102, Conference Room
Office hours: Monday, Wednesday, 15:00 - 17:00.

Secretary: Bonnie MacKinnon*, E-mail: compstudies@trentu.ca*
Office: OC 102.6, Phone: (705) 748-1011 ext.1495

Website: http://www.trentu.ca/webct

Texts:

Required:

Patterson, D. and Hennessy, J. Computer Organization and Design, 3rd
edition, 2005.
Jack, M. Computer Science 230H Lecture Notes.
Kjell, B. Programmed Introduction to MIPS Assembly Language
(http://programmedlessons.org/AssemblyTutorial)

Supplementary:

Stallings, W., Computer Organization and Architecture: Designing for
Performance 7th edition, 2006.

Course Description:

Organization of a simple stored-program computer: CPU, busses and
memory. Instruction sets, machine code, and assembly language.
Conventions for assembly language generated by compilers. Floating-point
number representation. Hardware organization of simple processors.
Address translation and virtual memory. Very introductory examples of
interrupt handling, multi-tasking systems, storage systems, and
interconnections.

Course Objectives:

Basic understanding of computer organization: roles of processors, main memory, and secondary storage systems.
Understanding the concept of pipelining and why it is needed.
Understanding arithmetic and logical operations with integer operands.
Understanding floating-point number systems and operations.
Understanding simple data path and control designs for processors.
Understanding memory organization, including cache structures and virtual memory schemes.
Understanding the concept of programs as sequences of machine instructions.
Understanding the relationship between assembly language and machine language.
Understanding the relationship between high-level compiled languages and assembly language.
Development of skill in assembly language programming.

Course content:

Lectures:

Introduction
Instruction Set Architecture (ISA)
Pipelining
Computer Arithmetic - ALU
Control Unit - CPU
Memory Hierarchy
Storage Systems

Seminars:

MIPS32 assembly language programming using SPIM simulator.

Class meetings:

Lectures are Mondays 17:00 - 19:00 in GCS 110.
Seminars are Wednesdays 17:00 - 19:00 in GCS 110.

Grading scheme:

  6%   6 topic summaries
30%   6 quizzes
30%   3 assembler language programming assignments
34%   Final exam

Notes:

For each of the lecture topics you are to prepare a brief summary of what you think the topic is about. The summary should be limited to a page. Use any resources such as Internet and books and provide reference for the source from where you acquired the information. The summary is to be submitted before the lecture on the respective topic begins. For example, on Monday, September 17th, you are to hand in a summary on Instruction Set Architecture (ISA). Failure to submit a summary before the class will result in assignment of grade 0 for the respective summary.

Examination policy:

All quizzes are open text book. The duration of each quiz is one hour. Final exam is open text book. The duration of the final exam is three hours. The final exam will be structured around quiz questions and assembly language programming assignments. The better you do on the quizzes and assignments, the easier it will be for you to "ace" the final.

No computers may be used during the quizzes and the final examination. The only digital devices permitted are calculators and digital wristwatches. Cell phones must be turned off during examinations.

Assignment submission policy:

All assignments are to be submitted using the myLearningSystem (WebCT) assignment drop box tool. Do NOT email the assignments or slide them under anyone's door. They will NOT be accepted.
For each assignment there is a due date and a cutoff date. Any assignment submitted past the due date will incur a penalty of 10% per day. No assignments will be accepted past the cutoff date.

Missed or Delayed Term Work:

You are expected to complete all programming assignments and hand them in on time, and you are expected to write the quizzes at the scheduled time.
If you don't hand in some term work due to illness or another legitimate reason, Michael Jack is willing to make accommodations, but only if you report the problem to Michael Jack (not anyone else) as soon as is reasonably possible. Accommodations for missed term work will be decided on a case-by-case basis; typically they will involve either accepting assignments after the due date or making changes to the weighting used to compute the course grade.

Academic Dishonesty:

Academic dishonesty, which includes plagiarism and cheating, is an extremely serious academic offence and carries penalties varying from failure in an assignment to suspension from the University. Definitions, penalties, and procedures for dealing with plagiarism and cheating are set out in Trent University's Academic Dishonesty Policy which is printed in the University Calendar.

Get help, but do not cheat!

You are encouraged to discuss the assignments with the instructor, lab adviser, and fellow students, since this is one of the best ways to learn the material. However, you should not let anyone write your programs or solve other exercises for you. When you hand in your assignments, ask yourself two questions:

Do I understand all the material I am handing in?
Could I do this assignment over again without any help?

The answer to both questions should be YES.
Computers allow electronic copying of programs, which makes it very easy to cheat in a course like COSC 230. If you are caught cheating you will be reported to the Dean's Office for appropriate discipline. If you cheat and don't get caught, you are still in trouble, because examination marks count more than assignment marks in your final course grade.

Access to Instruction:

It is Trent University's intent to create an inclusive learning environment. If a student has a disability and/or health consideration and feels that he/she may need accommodations to succeed in this course, the student should contact the Disability Services Office (BL Suite 109, 748-1281, disabilityservices@trentu.ca) as soon as possible. Complete text can be found under Access to Instruction in the Academic Calendar.

Proposed Course Schedule (may slightly change as the course progresses)**:**

Date	Type	Location	Start Time	Duration	Topic
September 10	Lecture 1	GCS 110	17:00	2 hrs.	Introduction
September 12	Seminar 1	GCS 110	17:00	2 hrs.	MIPS
September 17	Lecture 2	GCS 110	17:00	2 hrs.	Instruction Set Architecture
September 19	Seminar 2	GCS 110	17:00	2 hrs.	MIPS
September 24	Lecture 3	GCS 110	17:00	2 hrs.	Instruction Set Architecture
September 26	Quiz 1 and Seminar 3	GCS 110	17:00	2 hrs.	Instruction Set Architecture, MIPS
October 1	Lecture 4	GCS 110	17:00	2 hrs.	Pipelining
October 3	Seminar 4	GCS 110	17:00	2 hrs.	MIPS
October 8 Thanksgiving	-	-	-	-	-
October 10	Quiz 2 and Lecture 5	GCS 110	17:00	2 hrs.	Pipelining, Computer Arithmetic
October 15	Lecture 6	GCS 110	17:00	2 hrs.	Computer Arithmetic
October 17	Seminar 5	GCS 110	17:00	2 hrs.	MIPS
October 22 and 24 Reading week	-	-	-	-	-
October 29	Lecture 7	GCS 110	17:00	2 hrs.	Computer Arithmetic
October 31	Quiz 3 and Seminar 6	GCS 110	17:00	2 hrs.	Computer Arithmetic, MIPS
November 5	Lecture 8	GCS 110	17:00	2 hrs.	Computer Arithmetic
November 7	Quiz 4 and Seminar 7	GCS 110	17:00	2 hrs.	Computer Arithmetic, MIPS
November 12	Lecture 9	GCS 110	17:00	2 hrs.	CPU Control Unit
November 14	Quiz 5 and Seminar 8	GCS 110	17:00	2 hrs.	CPU Control Unit, MIPS
November 19	Lecture 10	GCS 110	17:00	2 hrs.	Memory Hierarchy
November 21	Seminar 9	GCS 110	17:00	2 hrs.	MIPS
November 26	Lecture 11	GCS 110	17:00	2 hrs.	Memory Hierarchy
November 28	Quiz 6 and Seminar 10	GCS 110	17:00	2 hrs.	Memory Hierarchy, MIPS
December 3	Lecture 12	GCS 110	17:00	2 hrs.	Storage Systems
December 5	Seminar 11	GCS 110	17:00	2 hrs.	Final exam review