Course Outline

Introduction to Computer Systems COMP 273 (Winter 2019)

Instructor:	Professor Kaleem Siddiqi
Office:	McConnell Engineering, Rm. 420
Tel:	514-398-3371
Email:	siddiqi@cim.mcgill.ca
Course Web Page:	`mycourses2.mcgill.ca`
Course Times: (001):	T/Th: 14:35 - 15:55, SADB M-1
Course Times: (002):	T/Th: 10:05 - 11:25, Stuart Biology N2/2
Office Hours:	Tuesdays 12:00 - 13:00 (or by appointment)

Teaching Assistants (Room assignments and times are not yet finalized)
Aashima Singh: aashima.singh@mail.mcgill.ca, Office Hrs: F. 15:00 - 17:00, TR 3110
Jesse Islam: jesse.islam@mail.mcgill.ca, Office Hrs: T. 16:30 - 18:30, TR 3110
Olamilekan Fadahunsi: olamilekan.fadahunsi@mail.mcgill.ca, Office Hrs: W. 13:00 - 15:00, TR 3110
Pulkit Khandelwal: pulkit.khandelwal@mail.mcgill.ca, Office Hrs: W. 17:00 - 19:00, TR 3110
Richard Olaniyan: richard.olaniyan@mail.mcgill.ca, Office Hrs: M. 13:30 - 15:30, TR 3110

Introduction

The course gives a bottom up view of how a computer works. It begins with a overview of digital logic, and then builds up the main architectural and system elements of a typical modern computer. We use a specific RISC computer architecture and assembly language, MIPS, to illustrate the main concepts.

List of Topics (subject to minor alterations)

1. Digital Logic (5 lectures)
    - Number representations
        - binary, twos complement, floating point, hexadecimal
    - Combinational logic
        - truth tables, gates, adders, encoders, decoders, multiplexors, ROM
    - Sequential logic
        - latches, flop flops, registers, integer multiplication and division.
2. MIPS assembly language (8 lectures)
    - arithmetic and memory

- decisions
- logical operations
- instruction representation
- floating point operations
- procedures
- linking

3. MIPS CPU architecture (3 lectures)
    - datapath and control
    - fetch-execute
    - exceptions and the kernel
4. Memory (3 lectures)
    - RAM
    - virtual memory
    - cache
5. I/O (2 lectures)
    - interrupts and exceptions
    - memory mapped I/0, direct memory access

Lecture Notes and Lecture Recordings

All material covered in the lectures will be made available as PDFs or powerpoint files on the mycourses web page. In addition, lectures will be recorded and made available. There are two sections of the course, but these are merged on a single mycourses page.

Reference Textbooks

There is no required textbook for the course, but the Patterson and Hennesey text is recommended. If you wish to do further background reading the text is also available on *two hour reserve in the Schulich Library*. Call Numbers can be found from the McGill libraries website (see MUSE, Course Reserves). Either editions 4 or 5 would be fine.

For further details on MIPS, see:

- "Computer organization and design: the hardware/software interface" by David A. Patterson and John L. Hennesey.
- "See MIPS run", by D. Sweetman

Co-requisites

- COMP 250 *Introduction to Computer Science* (unofficial, but strongly recommended)
- COMP 206 *Introduction to Software Systems* (official)

If you have not taken 206 or you are not taking it currently, then you should not take COMP 273. The only exception would be if you have some prior experience with C or C++ programming.

Evaluation

- 35 % Assignments: There will be 4 assignments in total, but the second two will be worth more than the first two (A1: 7.5%, A2: 7.5%, A3: 10%, A4: 10%).
- 15 % Mandatory mid-term to be held on Thursday Feb 14th, 6:00pm to 7:30pm. There will be no class on that day.
- 50 % Final Exam (during Final Examination Period in April)
  - It will cover the whole course.

In accord with McGill University's Charter of Students' Rights, students in this course have the right to submit in English or in French any written work that is to be graded.

McGill policy on academic integrity

McGill University values academic integrity. Therefore, all students must understand the meaning and consequences of cheating, plagiarism and other academic offenses under the Code of Student Conduct and Disciplinary Procedures. See `http://www.mcgill.ca/students/srr/honest/` *and See* `http://www.mcgill.ca/integrity` *for more information*

Diversity and Inclusion

COMP 273 is meant to be an introductory course to a fundamental area in CS, which is the interface between hardware and software. Our goal is to make this content equally accessible to students of all backgrounds. We shall work to pro-actively acknowledge and address any bias that may occur during the term. Equal treatment of students from every gender, race and orientation is a top priority. We openly welcome suggestions on how to improve inclusion, by contacting the TAs or instructor either with your name or anonymously. Please feel free to meet us in person to discuss any particular challenges you are facing. Those facing unforeseen challenges such as issues related to physical or mental health, are encouraged to register with OSD, to receive special consideration when taking examinations and tolerance at other times.

MyCourses Discussion Board

The instructor and the TAs will moderate the discussion board. Please obey the following. Postings that do not conform will be deleted.

- Be clear: Make sure that what you have written makes sense.
- If you would like your posting to be deleted, just add a request within the thread. No problem.
- Choose a suitable subject line.
- If you have multiple questions that are unrelated, then use multiple threads.
- Use the search feature to see if your question has been asked before.
- Do not email me with a technical question about the course material. Instead, post the question on the discussion board so that everyone can benefit from the correspondence. Also, this way the TAs can respond quickly as well.
- Be polite.
- Keep clutter down. e.g. "Thank you" notes should be sent privately.

Miscellaneous Policies

Final grade: There are many factors that determine your grades including how hard you work, how talented you are in this area, how much time you have available because of other commitments, what your academic background is, what your health situation or family situation is, etc. However, in fairness to all the students when I assign your final course grade, I will not take these other factors into account. I assign the final grade only based on your assignment and exam scores.

Additional Work: Students with grades of D, F or J will *not* be given the opportunity to complete additional work to upgrade their grade.

Supplemental Exam: One will be offered and it will cover the same material as the Final Exam and your mark on it will replace the Final Exam grade. In other words, its is a 50% supplemental. Your assignment and midterm marks will still count. For information on Supplemental Exams, see `http://www.mcgill.ca/exams/dates/supdefer`.

Cheating/Collaboration: I encourage you to discuss the assignments with each other. But no sharing of code! And your discussion should be *public* in the sense that anyone including me should be allowed to listen in.