

Course Outline

Introduction to Computer Systems

COMP 273

(Fall 2017; WF 16:05:-17:25; ENGMC 13)

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Teaching Assistants

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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/O, 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.

Reference Textbooks

There is no required textbook for the course, but the Patterson and Hennessy 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. Hennessy.
- “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

- 30 % Assignments: There will be 4 assignments in total, but the weight of each assignment will be adjusted to reflect its complexity. Roughly speaking, the first two assignments will carry less weight than the second two.
- 20 % In class mid-term to be held on Friday October 27th.
- 50 % Final Exam (during Final Examination Period in December)
 - It will cover the whole course.
 - You may use the Final Exam to replace your midterm grade, should this be beneficial to you. In that case, the Final Exam will be worth 70 % of your grade.

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 www.mcgill.ca/integrity for more information

MyCourses Discussion Board

The instructor and the TA's 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.
- 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, 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: It will take place at the end of the Winter term, typical in May 2018. It will cover the same material as the Final Exam and will replace the Final Exam grade. For information on Supplemental Exams, see <http://www.mcgill.ca/artscisao/general/exams/supplemental/>.

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