Introduction to Computer Organization with Assembly.
CSCI 2121 Winter 2016

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Office Hrs: Mon, Tue 10:30 -12:30/Open Door

Text: *(i) The Elements of Computing Systems: Building a Modern Computer from First Principles* by Noam Nissan and Shimon Schocken. MIT Press 2005. (Chs. 1 - 6 of the text, the part used for the course, are available electronically at: *http://www.nand2tetris.org*) *(ii) Programming from the Ground Up* by Jon Bartlett (see web-page for link to e-book). Material will **not** be limited to the texts. A schedule of topics, some references and class notes will be posted. **It is your responsibility to attend classes and labs.**

Labs: There are 4.5 contact hours a week: **3 hours of lectures** and 1.5 hours of laboratories. Laboratories will be held in *teaching Labs 1 and 2* in the COMPUTER SCIENCE building. The tutorials are used for hands-on experience at building a modern computer from first principles. The software (under GPL) for this will be available on the disk image, in TL 1 and 2 and can be found at: *http://www.nand2tetris.org/software.php*. The first part of the course covers Projects 1 to 6 of *nand2tetris*. Further labs, concentrating on applications of assembly language and exploring an x86 based, 32-bit, Linux computer will be held towards the end of term. **Lab attendance is mandatory** and **can** significantly affect your grade.

Intellectual Honesty: I expect that students will discuss lab solutions and assignment problems and help each other **but** I insist that the labs and assignments handed-in for marking are the students' own work. **To this end, please read and understand the regulations at:**
`http://academicintegrity.dal.ca` and
the full text of Dalhousie?s Policy on Intellectual Honesty and Faculty Discipline Procedures at:
`www.dal.ca/dept/university_secretariat/academic-integrity/academic-policies.html`
In addition, Dalhousie University's student code of conduct can be found at:
`http://www.dal.ca/dept/university_secretariat/policies/student-life/code-of-student-co`

Evaluation: (Subject to minor adjustment in the first two weeks

Assignments + Labs	8 % + 47%	
Mid-Term	18 %	23 Feb (in class)
Final Exam	27%	

Course Description: *from the calendar...*
This class deals with the fundamentals of computer organization with assembly language used as an aid to studying computer organization. Topics include digital logic, ALU and CPU design, object code, microprogramming, and an introduction to parallel computers..
The course objective is to familiarize you with the fundamental building blocks of computers and the basic concepts of how a computer maps a computer language into actual execution paths on hardware. Assembly language is a vehicle to demonstrate how the hardware eventually executes software instructions. This is a course on **how a computer works**.

Topics: *(from curriculum - order will vary. Check web-page)*

Digital logic and digital systems (9 hours)

Simple building blocks: Logic expressions; Simple adders, structure of a simple arithmetic-logic unit (ALU); Basic latches and flip-flops

Machine level representation of data (9 hours)

Numeric data representation and number bases; Fixed- and floating-point systems; Signed and twos-complement representations; Representation of non-numeric data; Algorithms for arithmetic operations.

Assembly level machine organization (9 hours)

Basic organization, Control unit; instruction fetch, decode, and execution; Instruction sets and types (data manipulation, control, I/O); x86 Assembly/machine language programming; Instruction formats; Addressing modes;

CPU implementation (3 hours)

Hardwired realization of CPU; Microprogrammed realization; formats and coding; Varieties of instruction formats;

Intro. to Parallel Computing (3 hours)