CMPUT 229 CMPUT ORG/ARCHITECTURE I (LEC B1 Wi20)

Course Outline

CMPUT 229 Computer Organization and Architecture I Course Outline

General Information

- **Term:** Winter 2020
- **Date:** TR
- **Time:** 9:00AM - 10:50AM
- **Location:** CSC B 2
- **Credits:** 3
- **Contact:** See the contact information for details about your instructor and teaching assistants.

Updates after COVID-19 Situation

Following the unfortunate COVID-19 situation, I have made the following changes to the course deliverables and how the students will be assessed. I have also communicated these changes to the students via the eClass forum and during the livestream of our lecture.

- Quizzes 4 and 5 will be online, and will still carry the same weight.
- Midterm 3 will be online (via a quiz activity on eClass), and will still carry the same weight.
- Final Exam will now be a coding assignment (which was Lab 5 in the old course outline), and will still carry the same weight. IT will be due at 5pm on April 23rd, which is the same deadline of our old in-person written exam. Students have access to the exam instructions starting today and have almost a month to solve it with help from myself and the TAs.
- Following the university enforced policy, final assessment is now CR/NC. I have not changed the pre-communicated grade cut-offs in the course outline. Students will still know their supposed letter grade. A student achieve a letter grade D or better will receive CR on their official grade. A grade lower than D will be NC according to that new policy.
- Following the university guidelines, upon request from the student, I am happy to provide them with an official letter that will describe more what their CR grade is (i.e., the letter grade the student would have taken under normal circumstances, grade distribution among all course deliverables, etc).

Overview

General introduction to number representation, architecture and organization concepts of von Neumann machines, assembly level programming, exception handling, peripheral programming, floating point computations, and memory management.

Learning Outcomes

After this course, you will understand:

- how machine code is generated by a compiler or by an assembly programmer,
- the interface between software and hardware, and
- the major issues with the design and implementation of parallel programs that run in multiple processors.

Acquired Skills

After this course, you will understand:

- MIPS assembly programming skills,
- debugging skills (both through testing and stepping through code),
- solving an architecture design problem given a textual description, and
- using command line tools and GitHub

Pre-requisites

- **Pre-requisites:** CMPUT 115 or 175.
- **Co-requisite:** CMPUT 201.
- **Note:** credit may be obtained in only one of CMPUT 229, CMPUT 285, or EE 380.

Course Topics

1. Why Computer Architecture?
2. Instruction Set Architecture.
3. Loops, Procedures, and Recursion.
4. Numerical Representation and Arithmetic for Computers.
5. The Processor.
6. Memory Hierarchy.
7. Input/Output and Storage.
8. Multicores and Multiprocessors.

Course Work and Evaluation

When computing the final grade, we will drop the quiz with the lowest grade from the set of all quizzes. The weight of a missed midterm with a prior excused absence will be automatically transferred to the weight of the final exam. This policy is intended to offer a built-in insurance for unforeseen circumstances that may prevent a student from completing all quizzes and midterms. Students are encouraged to complete all the coursework (including the optional labs and assignments), because each deliverable is designed to cover a different portion of the course content. The final deadlines for all course deliverables are available on the course schedule.

Course Work	Weight
Quizzes	10%
Midterms	60%
Final Exam	30%

Assignment of Final Letter Grades

To get a passing grade in this course, your total grade in the course should be at least 51%. To remain fair to all students who are registered in the course, we will neither curve the final grade, nor will we use historical grade distributions to assign the final letter grades. We will use the following grade cut-offs:

Letter Grade	Minimum Percentage
A+	92
A	86
A-	80
B+	77
B	73
B-	70
C+	67
C	63
C-	60
D	51
F	0

Course Materials

We will mostly follow this textbook: **David Patterson and John Hennessy, *Computer Organization and Design*, 5th edition, Morgan Kaufman, 2014.** We will also cover limited selected material from the following books (students do not need to buy these other books):

- Alan Clements, *Principles of Computer Hardware*, 4th edition, Oxford University Press, 2006.
- Yale N. Patt and Sanjay J. Patel, *Introduction to Computing Systems: From Bits and Gates to C and Beyond*, McGrawHill, 2001.

However, we will not follow a specific deck of slides in this course, neither will I hand out any lecture notes. I will however handout some code examples throughout the semester when needed for in-class exercises. I strongly recommend that you take notes in class (even if you never read them later), because that, as prior research has shown, will tremendously help you acquire the knowledge shared in the classroom.

Computing Science Course Policies

The Department of Computing Science has a set of course policies that this course follows. Furthermore, CMPUT 229 has an additional set of policies that will be used for the course. You can find those policies here.

Academic Integrity

The University of Alberta is committed to the highest standards of academic integrity and honesty. Students are expected to be familiar with these standards regarding academic honesty and to uphold the policies of the University in this respect. Students are particularly urged to familiarize themselves with the provisions of the Code of Student Behaviour and avoid any behaviour which could potentially result in suspicions of cheating, plagiarism, misrepresentation of facts and/or participation in an offence. Academic dishonesty is a serious offence and can result in suspension or expulsion from the University. (GFC 29 SEP 2003)

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