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CMPT 2295: Introduction to Computer Architecture

EFFECTIVE DATE

September 2020

DEPARTMENT

UT Computing Science&Software

DESCRIPTION

This course introduces students to computer system design and architecture and low-level programming. This course covers fundamental aspects of computer system design and the relationship between the computer architecture (hardware) and computer programs (software). Topics include number representations, digital systems, building blocks in a computer, CPU organization, bus structures, addressing modes, memory managements, computer interfacing, low-level-programming and system software. Students will be able to apply principles and concepts to improve program efficiency and runtime. Programs will be written in C and x86-64 assembly languages.

CREDITS

3.0

YEAR OF STUDY

2nd Year Post-secondary

PREREQUISITES

CMPT 1020 with a C and MATH 1120 with a C

COREQUISITES

None

COURSE LEARNING OUTCOMES

Upon successful completion of this course, students will be able to:

- Describe numbers of various bases and arithmetic operations
- Define fixed point and floating point numbers
- Explain the building blocks of computers
- Describe how various components of a modern computer function and cooperate
- Evaluate various trade-offs in computer system design
- Design and implement programs in machine and assembly languages

- Describe the fundamental principles of CPU and control unit design
- Demonstrate an understanding of the relationship between the machine language and the computer hardware in the context of functionality and complexity
- Describe how various computer components interact in order to exchange information
- Describe the complexity and speed of various architectural components
- Describe hardware and software techniques for input and output device interfacing
- Describe how I/O systems work

PRIOR LEARNING ASSESSMENT & RECOGNITION (PLAR)

None

HOURS

Lecture: 45

Lab: 15

INSTRUCTIONAL STRATEGIES

Lectures and computer labs (and assignments)

GRADING SYSTEM

Letter Grade (A-F)

PASSING GRADE

C-

EVALUATION PLAN

Type	Percentage	Assessment activity
Assignments	20	In class and take home assignments
Midterm Exam	35	2 Midterms; 17.5% each
Lab Work	10	
Final Exam	35	

COURSE TOPICS

- Information Representation in Computers
Number Systems

Signed and Unsigned Integers
Bit Level Manipulation
Floating Point Numbers
Machine Level Programming
CPU Structure
CPU Registers
Arithmetic and Logical Operations
Bus Systems
Control Structures
Stack Structure
Calling Conventions: Passing Control and Data
Memory Organization
Memory Technology
Memory Layout
Virtual Memory and Address Translation
Exceptional control flow
Interrupts
I/O programming and interfacing
Multi-tasking
Parallel Computing

LEARNING RESOURCES

None

Notes:

- Course contents and descriptions, offerings and schedules are subject to change without notice.
- Students are required to follow all College policies including ones that govern their educational experience at VCC. Policies are available on the VCC website at:
<https://www.vcc.ca/about/governance--policies/policies/>.
- To find out how this course transfers, visit the BC Transfer Guide at <https://www.bctransferguide.ca>.

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