CPSC 461: Computer Architecture and Operating Systems

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Class Meetings: MW: 2:20pm - 3:50pm

Office Hours: M: 1pm - 2pm; T: 2pm -3pm; Th: 3pm - 4pm; and by appointment

All class and lab meetings will be via zoom. All office hours through the semester will be via zoom. The zoom links to the class meetings and office hours are on the Inquire page for the course.

Syllabus

This course presents a combined introduction to the concepts of computer architecture and operating systems. In particular, we will discuss processor design, assembly and machine language, translation from assembly language to machine language, processor scheduling, memory management, virtual memory, file systems, machine level representation of data, digital logic, and processor implementation.

Reference Text: *Computer Systems: An integrated approach to Architecture and Operating Systems*, by Umakishore Ramachandran and William D. Leahy.

Prerequisites: CPSC 250.

Intended Learning Outcomes

At the end of this course successful students will be able to:

1. design and implement an assembler given the assembly and machine language instruction sets for a processor,

2. design and implement a simulator for a given processor architecture,

3. design and implement various functions of an operating system, including process management, memory and virtual memory management and file systems,

4. understand the design of the control unit, the arithmetic logic unit and data paths in a processor.

Mechanics

The course will meet in class for three hours during the week. There will be two tests on **Monday, February 14, 2022**, and **Monday, March 21, 2022** in class during the semester. There is no final exam in this course; the last project will take place of the final.

Make-up tests will be available *by pre-arrangement only* in case of scheduling conflicts. After the test, make-ups will be available only in case of documented medical emergencies.

Besides the exams, there will be regular quizzes in class, regular homework assignments, programming projects, and a co-curricular requirement.

This course expects you to spend *at least* 12 hours of work each week inside and outside of class.

All programming assignments will be completed using the C++ programming language. All submitted programs must be able to be compiled and run on the computer science server. Please see the document "Computing Infrastructure" on the course Inquire page.

Co-curricular Requirement: The Mathematics, Computer Science and Physics department offers a series of talks that appeal to a broad range of interests related to these fields of study. These co-curricular sessions will engage the community to think about ongoing research, novel applications and other issues that face these disciplines. Each student is required to attend at least *three* of these sessions, and turn in a short paper describing the contents of the session, and his/her *critical reflections* about the topic and content. These papers are due by email within a week of the session. A paper submitted beyond a week from the event being discussed in the paper will not be accepted. (Please also see the document "MCSP Reflections" on the course Inquire page).

Grading

The weights for the various components will be:

Co-curricular	4%
Quizzes	10%
Homeworks	10%
Midterm	16%
Projects	60%

The final letter grade will be computed according to the following scale:

< 60	60 – 62	63 – 65	66 – 69	70 – 72	73 – 75	76 – 79
F	D-	D	D+	C-	C	C+

	80 – 82	83 – 85	86 – 89	90 – 92	> 92	
	B-	B	B+	A-	A	

Class Attendance and Policies

Regular attendance in class is highly recommended. Regardless of attendance, students are responsible for all material covered or assigned in class.

Cell phones should be kept in your backpacks or pockets (essentially, out of sight), and turned to the silent mode throughout the duration of the class (even when the class meets online). Please do not remove your cell phones until you are outside the classroom/lab. Similarly, during office consultations or consultations in the lab (even when it is not during regular class time), your cell phones should be out of sight and in the silent mode.

If you use an electronic device such as a tablet or a laptop for note-taking or to read the textbook, the content that is open on the screen should be strictly restricted to documents and pages of relevance to the class. For example, you should not have any social media websites open in your browser window, even if it is in a tab that is not currently in focus.

Academic Integrity

Students are expected to adhere to the Academic Integrity policies of Roanoke College. All work submitted for a grade is to be strictly the work of the student unless otherwise specified by the instructor. The policies as outlined in the Academic Integrity handbook will be enforced in the course.

Graded programs are subject to the Roanoke College Academic Integrity policies. Copying a program or a portion of a program (even a single line) or reading another person's program to obtain ideas for solving a problem is plagiarism. Other examples of integrity violation include writing code for someone else, using code written by someone else, telling someone else how to solve a problem or having someone tell you how to solve a problem (and using his/her method). These cases apply to any work that is handed in for a grade under the instructor's assumption that the work is your own. Unless specified otherwise by the instructor, discussion among students should be limited to general discussion of concepts and language details, not specific aspects of a solution to the assigned problem.

If I need to make modifications to the syllabus during the semester I will make the changes only after discussing them with the class.