CSCI226: Computer Systems & Organization

Fall 2026

Instructor:	Asst. Prof. Mark Moeller
Email:	mmoeller@holycross.edu
Office:	Swords 332
Office Hours:	Thurs., 2-4pm
Lecture:	Tues/Thurs, 9:30-10:45am, Swords 330
In-person Quiz Dates:	Quiz 3: Thu., Nov. 5 2:00-3:30pm
	Quiz 6: Thu., Dec. 10 3:00-4:30pm
Routine:	Take-home quizzes due Wed. afternoon, projects due ~~Thurs. night~~ Fri. morning

Course Description

This course covers fundamental topics related to the design and organization of modern computing systems, including basic digital logic design, machine level representation of data, microcode, assembly language and organization (to understand how high-level programs are converted into low-level instructions that can be executed by hardware, and how programs interface and communicate with other devices), memory organization (and how it may affect the performance of programs), management and architecture, program segmentation and linking, multi-tasking and some operating system features.

Learning Objectives

By the end of this course, students will be able to:

- Develop a deep understanding of the structure of computer systems, the breadth of possible designs, and the rationale underlying the organization of modern computing systems.
- Gain experience with digital circuit design (combinational and sequential), digital data representation, and low-level programming (assembly and machine code).
- Obtain a foundation of knowledge sufficient to approach advanced computer systems- related topics, including operating systems, compilers, programming language design, and computer networks.

Prerequisites

Recommended background for this course is given by CSCI 132. A grade of C or higher in that course, or permission of Computer Science Coordinator, is required to enroll. Enrollment limited to CSCI majors and minors. The course is intended for students who are majoring or minoring in Computer Science.

Required Textbook

N/A!

Recommended Textbook

Linda Null. *Essentials of Computer Organization and Architecture (6th Ed).* Jones and Bartlett Learning 2023. ISBN: 978-1284259438

Grading

42%	Projects (7 total @ 6% each)
35%	Take-Home Quizzes (5 total @ 7% each)
21%	In-Person Quizzes (2 total @ 10½% each)
2%	Course Participation

Policies

Lectures

Most weeks, we will have two lectures lasting approximately 75 minutes each, corresponding to two regularly scheduled class times. Lectures are intended to provide critical content for the course.

Projects

About every fortnight (i.e., two weeks), we will have one project. The goal of these projects is to deepen and further solidify your understanding of the course material, by engaging with the material in a different way than lecture alone can provide. Many are hands-on. Projects should be completed outside of class, and submitted in accordance with the academic integrity policy. The projects themselves will be released no later than 8:00pm on the dates specified on the Course Schedule (see below). Deliverables for projects should be submitted by ~~8:00pm on the specified due date~~ 8:00am on the day after the specified due date. Note: not all projects will strictly follow the fortnight schedule. Please see the Course Schedule, below, for all release dates and due dates.

Quizzes

About every fortnight, we will have one quiz. The goal of these quizzes is to assess your learning with regard to the course material by asking you to answer some questions and solve some problems. Quizzes should be completed **individually**, and submitted in accordance with the academic integrity policy. You will be asked to sign a short academic integrity statement as the first part of each quiz. Note: not all quizzes will strictly follow the fortnight schedule. Please see the Course Schedule, below, for all scheduled quiz dates. Quizzes are take-home and in-person. Most quizzes will follow the take-home format, which means that the quiz itself may be picked up any time after class (i.e., after 1:45pm) on the day it is released, and submitted any time before 1:00pm on the due date (usually the following day, see Course Schedule, below). Take-home format quizzes are designed to be completed in one hour of time, although you may work on the quiz for any amount of time, provided that it is submitted before the deadline. Exactly two quizzes will follow the in-person format, which means that the quiz itself will be given during a scheduled quiz period (see Course Schedule, below). In-person quizzes are designed to be completed in 90 minutes of time. Note: in-person quizzes will be cumulative, and count for more points than take-home quizzes, which will be non-cumulative.

Late Work

In general, no work submitted after the due date/time will be accepted. Extensions may be granted in extenuating circumstances, but any extension must be requested before the due date/time listed on the course calendar. Extension requests should be sent via email to the instructor, and must include a suggested alternative due date/time, which will be subsequently approved, modified or rejected by the instructor. The likelihood of an extension being granted decreases as the due date/time approaches, so plan ahead whenever possible!

Participation

Attendance at all classroom sessions is required. In addition to completing all required work, students are highly encouraged to participate in office hours. Students are encouraged to collaborate as much as possible, whenever appropriate, and within the confines of the academic integrity policies. You are expected to follow the Holy Cross policy on excused absences.

Academic Integrity

You are expected to follow the Holy Cross academic integrity policy. Any work submitted in this course for academic credit must be your own work. Collaboration with other students in this course is allowed, but submitted work must be your own. For example, you may work with other students to develop conceptual approaches to problem solving, to compare results, or to clarify syntax and work past bugs in your code. However, you may not, for example, copy another student's code and submit it as your own, and you may not produce results (e.g., figures, models) jointly with another student and subsequently submit those results for credit. You may not collaborate with students that have already completed this class or are not currently enrolled in this class.

For example, you may work with other students to develop conceptual approaches to problem solving, or to compare results. Such collaboration with other students must occur *away from a computer*, and anything written down during the discussion must be destroyed immediately following the discussion and before any student begins to write their own solution. Essentially, this means that using a blackboard or whiteboard is okay, but written notes, email, and messaging are not. When submitting a project, you will submit a brief log of the students you worked with, and which parts you discussed with them.

Artificial Intelligence

For this course, the use of generative AI models (e.g., ChatGPT, Claude, Gemini, Suarez) is *not allowed* to be used to help you complete *any assignments*. Using AI for completing any assigned work in this course counts as academic dishonesty under this policy, just as having someone else do your homework would be.

AI is allowed be used to help you reinforce topics in the course and study for exams, however, the normal cautions about the fallibility of the models apply.

Accessibility

If you need course adaptations or accommodations because of a disability, or if you have medical information to share with me that may impact your performance or participation in this course, please make an appointment with me as soon as possible. If you have approved accommodations, please don't hesitate to share your letter of accommodation with me, as appropriate. If you have not already done so, students with disabilities who need to utilize accommodations in this class are encouraged to contact

the Office of Student Accessibility Services as soon as possible to ensure that such accommodations are implemented in a timely fashion. Contact information for this office can be found here.

Inclusion

The Holy Cross Computer Science faculty recognize the existence of structural inequality in science, technology, engineering, and mathematics (STEM) education, and understand that student experiences of access and opportunities to succeed are systematically affected by social factors including race, ethnicity, gender, sexual orientation, and socioeconomic background. The program faculty have made specific commitments in seeking to build an inclusive computer science program. If you feel you have experienced or witnessed a situation that is inconsistent with these commitments, please access the options for making a report here. It is my intention that students from diverse backgrounds and perspectives be well-served by this course, that students' learning needs be addressed both in and out of class, and that the diverse perspectives that the students may bring to this class be viewed as a resource, a strength and a benefit. It is my intent to present materials and activities that are respectful of diversity. It is everyone's responsibility to support this inclusive environment and uphold our shared values. Your suggestions are encouraged and appreciated. Please let me know ways to improve the effectiveness of the course for you personally, or for other students or student groups.

Recording of Classes

Please note that, consistent with applicable federal and state law, this course may be video/audio recorded as an accommodation only with permission from the Office of Accessibility Services. Students are not permitted to record the contents of this class under any other circumstances.

Modifications

Modifications and updates to the policies outlined in this syllabus may occur to clarify or improve processes. Updates will be posted to the course website.

Approximate Course Schedule

Week	Date	Topic	Notes	Textbook/Assignment
1	Aug 25	Intro, History, Logic		Null Ch. 1
	Aug 27	Logic devices		Proj. 0 out
2	Sep 1	Logic devices		
	Sep 3	Data representation		Null Ch. 2.1-3,2.6; **Proj. 0 due**, Proj. 1 out
3	Sep 8	Data representation		
	Sep 10	Binary arithmetic		**Proj. 1 due**, Proj. 2 out
4	Sep 15	Combinatorial logic		Null Ch. 3.6, **Take-home Quiz 0** out
	Sep 17	Combinatorial logic		
5	Sep 22	Sequential logic		Null Ch. 3.7
	Sep 24	Sequential logic		**Proj. 2 due**, Proj. 3 out
6	Sep 29	Data paths		**Take-home Quiz 1** out
	Oct 1	Memory devices		
7	Oct 6	Instruction Set Architectures		
	Oct 8	MIPS Assembly		**Proj. 3 due**, Proj. 4 out
8	Oct 13	*No class*	Fall Break	
	Oct 15	*No class*	Fall Break	
9	Oct 20	MIPS Assembly		**Take-home Quiz 2** out
	Oct 22	Assemblers		
10	Oct 27	MIPS Control Flow		
	Oct 29	MIPS Data structures		**Proj. 4 due**, Proj. 5 out
11	Nov 3	MIPS Memory layout		
	Nov 5	MIPS Functions		**In-person Quiz 3**, 2:00-3:30pm
12	Nov 10	MIPS Functions		
	Nov 12	MIPS Functions		**Proj. 5 due**, Proj. 6 out
13	Nov 17	Caching		**Take-home Quiz 4** out
	Nov 19	Caching		
14	Nov 24	Cache-aware Programming		
	Nov 26	*No class*	Thanksgiving	
15	Dec 1	Performance		**Take-home Quiz 5** out
	Dec 3	Pipelining & Modern CPUs		**Proj. 6 due**
	Dec 10			**In-person Quiz 6**, 3:00-4:30pm

Notes:

- **Projects** are all due on ~~Thursdays at 8:00pm~~ Fridays at 8:00am (following the Thursday on which it is listed).
- **Take-home Quizzes** are assigned on Tuesdays and due the following day (Wednesday) at 1:00pm.
- Location for **In-person Quizzes** will be announced later.