CS 208.00　　　　　　**Introduction to**　　　　　　**Fall 2023**
Computer Systems

General Course Info

Time:	4a (MW 12:30pm-1:40pm, F 1:10pm–2:10pm)
Location:	LDC 104
Website:	https://www.cs.carleton.edu/faculty/tamert/courses/cs208-f23
Slack:	Click here for invite link

Instructor Info

Name:	Dr. Tanya Amert
Office:	Olin 301D
Email:	tamert@carleton.edu
Office Hours:	M 1:50pm-3:00pm (5a), W 3:10pm-4:20pm (6a), Th 2:00pm-3:30pm, F 9:40am-10:40am (2a), or by appt.

Prefect and Course Staff Info

Prefect:	Kyra Helmbold (helmboldk@carleton.edu)
Course Staff:	Lazuli Kleinhans (kleinhansc@carleton.edu)

Textbook

Required Textbook: *Computer Systems: A Programmer's Perspective*, 3rd edition, by Randal E. Bryant and David R. O'Hallaron (ISBN: 978-0134092669).

All lecture and homework materials will be available on the course website: https://www.cs.carleton.edu/faculty/tamert/courses/cs208-f23. In addition, your weekly programming assignments will be submitted through Moodle.

We are using Slack for questions and announcements. You can ask questions about any of the course material on Slack, but you must refrain from posting solutions to the assignments.

Course Description

Are you curious what's really going on when a computer runs your code? In this course we will demystify the machine and the tools that we use to program it. Our broad survey of how computer systems execute programs, store information, and communicate will focus on the hardware/software interface, including data representation, instruction set architecture, the C programming language, memory management, and the operating system process model.

Prerequisites

Computer Science 201 or instructor permission.

Target Audience

This course is designed for students majoring in Computer Science.

In this course, we will utilize the C programming language as we explore different system-level details, including how data is represented in a computer and how memory is accessed and managed. Given that CS 201 is a prerequisite, you are expected to have a working knowledge of a programming language; I will, from time to time, refer to features in Java and Python and compare them to how we use C.

Learning Objectives and Course Content

Throughout this term, we will explore the following questions:
- How is data (variables, programs, etc.) stored in a computer?
- What happens when we compile a program?
- How does a computer execute a program?
- How does the operating system manage multiple programs?
- How do computers communicate?
- What kinds of attacks do we need to watch out for when designing systems?

The course content is divided into four units:
1. Intro to C + Data Rep: C programming, number and character representations
2. Instruction Set Architecture + Memory: x86-64 ISA, memory hierarchies
3. Processes + Networking: OS process model, shells, networking

Key Dates

First day of class: Monday, September 11th
Last day of class: Wednesday, November 15th

No class: Monday, October 16th (Midterm Break)

Exam #1: Friday, October 6th
Exam #2: Friday, November 3rd
Final exam: Monday, November 20th, 8:30am – 11:00am

Technology Requirements

In this course, we will make use of a CS departmental server named `mantis`. You will need to be able to connect to this server; it is easiest to do so from your own laptop. If you do not have your own laptop, or your laptop ceases to work, let me know.

You are, generally, expected to refrain from laptop use during regular class periods (notetaking on a tablet is the exception). However, there will be special parts of classes, typically Mondays, when you should plan to have your laptop in class for some paired practice. Check the course schedule page for a list of upcoming labs.

Course Components and Grading

Course Components

Lessons: Class will usually be a mixture of lecture and small-group exercises. Students are expected to have completed a reading assignment prior to each lesson; in class, we may focus on some of the more complex topics from the readings. Periodically (typically Mondays), part of the class period will be devoted to hands-on lab activities.

Classwork: Many class periods will include graded in-class exercises ("classwork") designed to gauge pacing and general understanding of the material. This work will be done on paper, and begun on your own and completed with an optional partner. You need not prepare outside of class aside from doing the assigned readings. Classwork can be discussed in office hours to make up missed questions.

Assignments: The programming assignments in this course are a fundamental means of student learning. Assignments will typically be released on a Friday and due the following Thursday. Students are encouraged to work together on high-level topics, but you should review the collaboration policy carefully before discussing more detailed aspects of your work. In general, any code you write should be your own.

Exams: There will be three 60-minute exams covering the material in this course. The first two cover approximately four weeks each; the third exam, available during the final exam period, is split between covering the last two weeks of the term and cumulatively covering the entire term. All exams will be pencil-and-paper and done in class. The availability of note sheets will vary between exams – more information will be announced closer to exam dates.

Grading Criteria

Assessment	Count	Percentage
Classwork	~20	8%
Programming Assignments	~8	44%
Exams	3	48%

Classwork will be a part of many class periods, and is scored on a 2-point scale: 2 points for full completion, 1 point for partial completion, or 0 points if not enough questions are attempted to be assessable.

Programming assignments will typically be challenging assignments designed to encourage you to explore the course content in more depth. The grading scales will vary from one assignment to the next; see assignment descriptions for details.

Your grade for each of the first two exams is the maximum of your original exam grade (from the in-class exam) and the corresponding (optional) part of the final exam. The third exam occurs only during the final exam period, so your third exam score comes only from that part of the final exam.

Late Policy and Tokens

Each student starts the term with five tokens. These can be used on any programming assignment for any reason, no explanation necessary. One token provides an automatic 24-hour deadline extension. At most two tokens can be used on an assignment. To use a token, you should email me by the assignment's deadline (no explanation, just to say that you're using one).

If you do not use a token, or if you do but submit after the updated deadline, late submissions will be penalized 10% of the available points within the first two hours, or 50% of the available points within the first 24 hours. Any work submitted more than 24 hours after its deadline will receive no credit.

There is no token use needed to make up missed classwork. (This also means if you aren't feeling well, please stay home and get some rest!) You can make up classwork until 4pm on the last day of class.

Course Schedule

Note that the schedule is tentative, and subject to change.

Unit 1	Weeks 1-4	C + Data Rep: Ch. 1-2
	Week 4 (F 10/6)	Exam 1
Unit 2	Weeks 5-8	ISA + Memory: Ch. 3, 6, 9
	Week 8 (F 11/3)	Exam 2
Unit 3	Weeks 9-10	Processes + Networking: Ch. 8, 10, 11*
	Final (M 11/20)	Exam 3

*Note that some topics may be skipped or replaced depending on time constraints.

We will not meet for class on Monday October 16th due to Midterm Break.

Course Policies

Attendance Policy

Students are expected to attend all class periods. If you must miss class, you are responsible for checking the schedule to determine what you missed and studying that material on your own. If you know of an absence in advance, check with me for how you may best prepare.

Exams cannot be taken after the day on which they occur. If you know you must miss class, you may be able to take it in advance; discuss with me before your absence. If you're feeling unwell the day of the exam, we can arrange a separate room for you; if you're too sick to take the exam, you will need to rely on taking that portion of the final exam.

Student Hours ("Office Hours")

Student hours, also known as office hours, are a time that you can stop by to chat with me about anything. This includes questions about material covered in class or in the textbook, questions regarding assignments, exam preparation, the major in general, or any other topic.

You are welcome to stop by my office during any scheduled office hours; if you have a schedule conflict, send an email and we'll find a different time. You can also visit the office hours of our course staff or prefect for help with the course material.

Classroom Etiquette

In class, you are expected to maintain proper etiquette. This includes arriving on time, not having conversations during lecture, and most importantly not having your laptop/phone/newspaper/etc. out during lecture except on Mondays when we have labs exercises.

You are expected to take your own notes during class (this can be done on a tablet, but it must behave like a notebook – no web surfing!); you should not be taking pictures of the board.

Collaboration Policy

For programming assignments, you are allowed to work with up to one other student. You may look at your partner's code and help with debugging, but *you are expected to type up all of your code yourself*. If you worked with someone else, you must each include each other's names at the top of your C source files (see assignment instructors for more information). *You should never be looking at the code of anyone other than your one partner for a given programming assignment.* You may, however, discuss general approaches with others (for example at a white board); their names must be listed in your code files as well.

Exams are always closed-book and closed-note, and expected to be individual efforts. The availability of note sheets will vary – more information will be provided closer to each exam date.

You are expected to refrain from using any online source to provide the answers to your assignments, but you can use them for C mechanics.
  o Acceptable: Searching for the structure of a for loop in C.
  o Not acceptable: Searching for how to sort the lines of a file in C.

If any student is suspected to have violated the academic integrity policy, a report will immediately be made to the Academic Standing Committee, as described at https://apps.carleton.edu/campus/doc/integrity. Please ask me if you are unsure about what constitutes acceptable collaboration

Illness/COVID-19 Policy

Some of the policies stated in this syllabus may need to be modified at times due to COVID-19 or other illnesses. For example, if I have COVID, we may need to have some class periods over Zoom. If you test positive, you should talk to a friend to get notes, and let me know so that we can work around your absences to enable you to still achieve mastery over the course content. We will work together to make this term a success, and you will be informed about any necessary changes as soon as possible.

Inclusion

I strive to create an inclusive and respectful classroom that values diversity. Our individual differences enrich and enhance our understanding of one another and of the world around us. This class welcomes the perspectives of all ethnicities, cultures, gender identities, religions, ages, sexual orientations, disabilities, socioeconomic backgrounds, regions, and nationalities.

College Policies

Accommodations for Students with Disabilities

Carleton College is committed to providing equitable access to learning opportunities for all students. The Office of Accessibility Resources (Henry House, 107 Union Street) is the campus office that collaborates with students who have disabilities to provide and/or arrange reasonable accommodations. If you have, or think you may have, a disability (e.g., mental health, attentional, learning, autism spectrum disorders, chronic health, traumatic brain injury and concussions, vision, hearing, mobility, or speech impairments), please contact OAR@carleton.edu to arrange a confidential discussion regarding equitable access and reasonable accommodations.

Reporting Sexual Misconduct

Carleton is committed to fostering an environment free of sexual misconduct. Please be aware all Carleton faculty and staff members, with the exception of Chaplains and SHAC staff, are "responsible employees." Responsible employees are required to share any information they have regarding incidents of sexual misconduct with the Title IX Coordinator. Carleton's goal is to ensure campus community members are aware of all the options available and have access to the resources they need. If you have questions, please contact Laura Riehle-Merrill, Carleton's Title IX Coordinator, or visit the Sexual Misconduct Prevention and Response website.

Prefect Program

The [Prefect Program](#) offers optional collaborative learning sessions for participating classes. Prefect sessions review course concepts and often focus on critical thinking and problem-solving exercises centered on the course material. Our course prefect will use email, Moodle, or Slack to inform everyone in the class about upcoming sessions and availability for 1:1 tutoring.

Math Tutoring

The [Math Skills Center](#) supports all Carleton students in any mathematics course they are taking in which they are experiencing difficulty, either with the mathematical concepts or with the mathematical tools needed to succeed in the course. Their mission is to "level the playing field" by giving students who enter Carleton without strong mathematics backgrounds the tools they need to succeed here at Carleton.

Writing Center

The Writing Center provides a space staffed with peer writing consultants who can work with you during any stage of the writing process (brainstorming to final proofreading). Hours and more information can be found on the [writing center website](#). You can reserve specific times for conferences by using their [online appointment system](#).

Support for Students who use English in Addition to Other Languages

If English is not your primary or home language and you believe you might benefit from working regularly with a writing consultant this term, email Melanie Cashin, [Multilingual Writing Coordinator](#), at mcashin@carleton.edu. She can arrange once- or twice-a-week meetings between you and a specific writing consultant throughout the term.

Disclaimer

As instructor, I reserve the right to make changes to the syllabus, including assignment due dates, exam dates, and class cancellations or modality changes, for example due to weather or illness. These changes will be announced as early as possible.