CS-271: Networks & Systems

Calvin Deutschbein (they)

Willamette University, Spring 2024

E-mail: `ckdeutschbein@willamette.edu`
Office Hours: By Appt. & TBA
Office: Zoom, Ford 3rd Floor

Web: **cd-public.github.io/**
Lecture MW 2:50-4:20
Lecture Hall: Ford Hall 302

Course Description

Networks & systems form the boundry between abstractions firmly rooted in language and deeper questions in computing regarding the implementation of thinking machines at engineering and physical levels. This course will prepare computer scientists to reason at and across this abstraction boundry to more fully embrace the power of computation.

Students will learn low level languages of C and assembly, use command line tools to study these languages, use features of the operating system including parallelism and networking, and learn how to make changes to operating systems.

Required Materials

Required materials will be available on the course webpage.

Prerequisites

This class is meant for computer science students who have completed introductory coursework in programming. Students should complete Intro to Programming and Data Structures before enrolling in this class.

Accessability

I will make every effort to ensure all coursework and materials are accessible to all students, including working with on-campus specialists. However, there is always room for improvement. I always appreciate hearing from students about how I can make the course more accessible, so please reach out if there is something I can be doing better!

Course Objectives

This course will teach you techniques for reasoning about information and computing and controlled accesses to these resources. As a survey course of the broad discipline of computer security, it will focus on different abstraction levels, from cryptographic code at a low level to the cultural and economic implications of secure and insecure data access at a high level.

- You will practice using low level languages of C and assembly that do not fully obscure underlying hardware and operating system design decisions.

- You will gain experience working with command line tools to better understand computation.

- You will learn some historical efforts to develop and refine computing systems.

- You will learn about the constitution technologies that compose networks, including the Internet, and facilitate distributed computing.

- You will be exposed to state-of-the-art security research specific to hardware designs, including computer processors, as an example of ongoing research efforts.

This course will equip you apply notions of computer systems to your other coursework, within computer science as well as within the college, and empower you to be a responsible computer scientist and member of an increasingly computer reliant society.

Course Structure

The course will be composed of lectures, homeworks, midterms, and a final project.

Class Structure

Lectures are scheduled for Monday and Wednesday at Ford 204 at 2:50 PM. The schedule of lectures will be available on the course webpage.

Homework Structure

Feedback will be provided on homework assignments. Homework assignments will be considered when determining grades for this course.

Homeworks will consist of programming assignments to be completed outside of class and submitted for feedback. There will be a "Homework 0" at the beginning of the semester to get used to programming and assignment submission, then two homework assignments throughout the semester. You will always have at least two weeks to complete homework assignments.

As a rule, I encourage students to submit their assignment as-is at the due date and not to submit late work. By way of explanation, it is my experience as both a student and a grader that time spent working on assignments after their deadline is often better spent working on the next assignment.

As-is submission is supported in the grading policy by dropping the lowest homework grade. In special circumstances such as extended medical problems or other unforeseeable emergencies, please reach out and so we can collaboratively develop a more personal solution to achieve the learning objectives of the course.

Midterm Structure

Feedback will be provided on midterm exams. Midterm exams will be considered when determining grades for this course.

There will be two written midterm final exams, intended to be completed without access to notes or documentation. The midterms are intended to achieve a learning focus of reasoning about data structures in isolation from coding environments, as well provide me as an instructor with greater insight into how effective course instruction has been.

Final Project

Feedback will be provided on the final project. The final project will be considered when determining grades for this course.

The final project will be similar to the homeworks but more comprehensive and extensible in nature.

Feedback and Grading

Feedback will be provided on assignments, midterms, and the final project using a 100 point scale. Discussions will be graded by participation. This 100 point scale is intended to be familiar

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to established grading standards, such as letter grades. To provide aggregate feedback for the whole course, these feedback scores will be combined as follows:

- **40%** of your grade will be determined by homework assignments

- **40%** of your grade will be determined by midterm exams.

  20% each for the two midterms.

- **20%** of your grade will be determined by the final project.

Feedback scores will constitute the minimum grade on an assignment, but the instructor may exercise discretion at any time to award a higher grade. For example, a submitted homework may not use some important algorithmic technique as submitted, but if the student showed familiarity with this technique on an earlier assignment or exam, the absence of that technique in a specific case need not be counted against a student in grading, but only noted in feedback. This corresponds to the high level notion of feedback corresponding to how well an assignment reached the intended learning goals, while the overall course grade is meant to indicate that a student is prepared to succeed in latter coursework. Under this model, the final project will offer an opportunity to show familiarity with all content in the course, so a strong final project can ensure a high course grade for any student, regardless of prior scores on midterms and homeworks.

College Policies

The following material is adapted from "Information for Syllabus" recommended language on syllabus prepartion provided to insturctors in the College of Arts & Sciences. The following sections represent the views of the instructors employer, rather than the instructor themselves, and have been lightly editted in some cases for clarity and sensativity.

Time Commitment

Willamette's Credit Hour Policy holds that for every hour of class time there is an expectation of 2-3 hours' work outside of class. Thus, for this class you should anticipate spending 6-9 hours outside of class engaged in course-related activities. Examples include reading course materials, preparing for discussion, preparing and writing papers and exams.

Academic Integrity

Students of Willamette University are members of a community that values excellence and integrity in every aspect of life. As such, we expect all community members to live up to the highest standards of personal, ethical, and moral conduct. Students are expected not to engage in any type of academic or intellectually dishonest practice and encouraged to display

honesty, trust, fairness, respect, and responsibility in all they do. Plagiarism and cheating are especially offensive to the integrity of courses in which they occur and against the College community as a whole. These acts involve intellectual dishonesty, deception, and fraud, which inhibit the honest exchange of ideas. Plagiarism and cheating may be grounds for failure in the course and/or dismissal from the College. http://willamette.edu/cla/catalog/policies/plagiarism-cheating.php

Commitment to Positive Sexual Ethics

Willamette is a community committed to fostering safe, productive learning environments, and we value ethical sexual behaviors and standards. Title IX and our school policy prohibit discrimination on the basis of sex, which regards sexual misconduct — including discrimination, harassment, domestic and dating violence, sexual assault, and stalking. We understand that sexual violence can undermine students' academic success, and we encourage affected students to talk to someone about their experiences and get the support they need.

> **Please be aware that as a mandatory reporter I am required to report any instances you disclose to Willamette's Title IX Coordinator.**

If you would rather share information with a confidential employee who does not have this responsibility, please contact our confidential advocate at confidential-advocate@willamette.edu. Confidential support also can be found with SARAs and at the GRAC (503-851-4245); and at WUTalk - a 24-hour telephone crisis counseling support line (503-375-5353). If you are in immediate danger, you may reach campus safety at 503-370-6911.

DACA/Undocumented Student Advocate

Willamette is committed to supporting our DACA/Undocumented students in a variety of ways. This year, Tori Ruiz is the contact person for all DACA/undocumented students can provide those students with a number of external and internal resources that are available. Her contact information is email: truiz@willamette.edu, Office: 3rd Floor UC, Phone: 503-370-6447.

Diversity and Disability Statement

Willamette University values diversity and inclusion; we are committed to a climate of mutual respect and full participation. My goal is to create a learning environment that is usable, equitable, inclusive and welcoming. If there are aspects of the instruction or design of this course that result in barriers to your inclusion or accurate assessment or achievement, please notify me as soon as possible. Students with disabilities are also encouraged to contact the Accessible Education Services office in Smullin 155 at 503-370-6737 or Accessible-info@willamette.edu to discuss a range of options to removing barriers in the course, including accommodations.

If you are disabled person or person with a disability and have preference for indentity first or person first language, I would be grateful to be informed of your preference to best affirm you.

Religious Practice

Willamette University recognizes the value of religious practice and strives to accommodate students' commitment to their religious traditions whenever possible. Please let me know within the first two weeks of the semester if a conflict between holy days or other religious practice and full participation in the course is anticipated. I will do my best to work with you to determine a reasonable accommodation.

As an instructor, I will exercise my discretion to offer accomodations for conflicts after the first two weeks of the semester. You may always reach out to me, including retroactively, though the quality of the accomodation I am able to offer may improve given advanced warning!

SOAR Center Offerings: Food, Clothing, and School Materials

The Students Organizing for Access to Resources (SOAR) Center strives to create equitable access to food, professional clothing, commencement regalia, and scholarly resources for WU and Willamette Academy students. The SOAR Center is located on the Putnam University Center's third floor (in the former Women's Resource Center and across from the Harrison Conference Room). The space houses the Bearcat Pantry, Clothing Share, and First-Generation Book Drive and is maintained by committed students and staff and faculty advisers.

Trans Inclusion and Gender Justice

I am always appreciative of the opportunity to address you by your affirmed name, pronouns, and any other gender markers. Please advise me of this at any point in the semester so that I may may best respect you at all times.

If I ever misgender you in any way, I would greatly appreciate that you let me know, in whatever manner makes you comfortable, so that I can correct that error and endeavour to repair any harm.

Mental Health

As a student, you may experience a range of challenges that can interfere with learning, such as strained relationships, increased anxiety, substance use, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may diminish your academic performance and/or reduce your ability to participate in daily activities. Willamette services are available and treatment does work. If you think you need help, please contact Bishop

Health as soon as possible at http://willamette.edu/offices/counseling/. Crisis counseling is available 24/7 at WUTalk: 503-375-5353 and Campus Safety is available at 503-370-6911. Emergency resources are also available from the Psychiatric Crisis Center at 503-585-4949 and the National Suicide Prevention Lifeline at 1-800-273-8255.

Intellectual Property & Privacy

Willamette's Credit Hour Policy holds that for every hour of class time there is an expectation of 2-3 hours' work outside of class. Thus, for this class you should anticipate spending 6-9 hours outside of class engaged in course-related activities. Examples include reading course materials, preparing for discussion, preparing and writing papers and exams.

Class materials and discussions including recorded lectures are for the sole purpose of educating the students enrolled in the course. The release of such information (including but not limited to directly sharing, screen capturing, or recording content) is strictly prohibited, unless the instructor states otherwise. Doing so without the permission of the instructor will be considered an Honor Code violation and may also be a violation of other state and federal laws, such as the Copyright Act.

All of my course materials are open source. I will rely on some materials from our instructors, but believe they are all open source as well.