

DATA-599: Cloud Computing

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Willamette University, Summer 2024

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Lecture W or Th 6:00-9:50 PM

Portland Center

Course Description

This course introduces cloud computing as the solution to the problem of data-intensive programming at scale. We will survey the existing techniques in computing, their algorithmic basis, and explore them in practice. With the motivating example of the MapReduce programming model, we will examine Microsoft Azure, Google Cloud, Amazon Web Services, three common commercial platforms for cloud computing, and Hadoop, an open-source alternative. The course will be supplemented with discussions of virtualization and cloud security. Experience coding in Python is recommended.

Required Materials

Lecture materials will be available on the [course webpage](#).

Prerequisites

This class is meant to open to all students enrolled in professional degree programs at Willamette University. The primary audience is students enrolled in programs with the School of Computing and Information Sciences.

Accessibility

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 styles of thinking used by security researchers to contextualize their work in the broader context of computing and society.
- You will gain experience working with common coding practices for security, especially in the context of network and internet security.
- You will learn some historical efforts to attack and defend various computing systems, and discuss the implications of the state of computer security as a discipline and as deployed in practice..
- You will learn some theoretical background in formulating notions of security (the “logical foundations” of computer security).
- 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 security 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, discussion sections and presentations, and a written, in-class midterm. I reserve the right to administer a final examination, either in-person or via a take-home examination, but do plan to administer one at this time.

Lecture Structure

Lectures are scheduled for Wednesdays at 6:00-10:00 PM in the Portland Center. The schedule of lectures will be available on the [course webpage](#).

Lectures will be primarily be delivered via webhosted HTML5+CSS via Reveal.js. While I will make every effort to follow best practices for accessible teaching, I will make mistakes! Please, if you find some material is inaccessible for any reason do not hesitate to reach out. If you do not like these types of slides, you can tell me but you can also make not of it in your course evaluation - I'm trying things out!

Midterm Structure

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

There will be at least one written examination, intended to be completed in small groups with minimal to notes or documentation. Examinations are intended to achieve a learning focus of reasoning about security in isolation from course materials, as well provide me as an instructor with greater insight into how effective course instruction has been.

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.

Feedback and Grading

After some consideration, I've decided to move away from a traditional grading structure for this class. Rather than assign work with intent of assess student progress, assignments in this course will instead have the purpose of student learning. Consequentially, I intend to do the following.

- Students will begin the course with a grade of an "A"
Students will be expected to attend class.

Students will be expected to participate in class.

Students will be expected to treat fellow students with respect.

Students will be expected to complete response assignments.

- Students will be contacted privately by the course instructor in the unusual event they are not meeting expectations.

Students will not have an expectation of perfection.

Students will not lose points or a grade without discussion.

Students will have a chance to explain their engagement with the course.

- Students collectively within the class as a whole will receive collective feedback on ethics, communication, and teamwork.

Students will receive limited individual feedback in unique cases.

Students will be expected to provide respectful individual feedback to one another.

Students will be able to request feedback from the instructor at any time.

Students will receive narrative rather than quantitative feedback.

- Students will receive feedback on examinations.

Students will receive a course grade greater than or equal to their examination score.

College Policies

The following material is adapted from “Information for Syllabus” recommended language on syllabus preparation provided to instructors 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 edited 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 accommodation 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.