

# CS351 Design of Large Programs

Brooke Chenoweth

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## Instructor

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**Office Hours:** Tuesday 2pm-4pm via Zoom at <https://unm.zoom.us/j/95107430566>, Friday 1pm-3pm in person, or by appointment

## Learning Outcomes

1. An understanding of object-oriented design and object-oriented programming.
2. Ability to work both independently and as part of a varying size group.
3. Ability to architect software artifacts of varying sizes and complexity.
4. Ability to document the design of software artifacts.
5. Ability to faithfully transform a design into a code base.
6. Ability to generate robust and elegant code.
7. An understanding of fundamental concepts and techniques related to concurrent and distributed computing.

## Course Description

This project-oriented course is intended to help students acquire the design and programming skills needed to perform well in professional settings where they are expected to translate customer needs into functioning code. The emphasis is on understanding the complexities and subtleties of object-oriented design and on leveraging off object-oriented programming to deliver large complex programs that are elegant, modular, easy to use, and easy to modify

while delivering the expected level of performance. Design and programming concepts are first introduced and illustrated in lectures and later used in the laboratory on a series of projects exhibiting increasing levels of complexity and sophistication. Sequential, concurrent, and distributed design and programming concepts are introduced in this order with the associated projects matching the increase in complexity. Depending on the project, students will be expected to work alone or in small groups. Peer reviews will be an integral part of the laboratory experience.

## Schedule of Topics<sup>1</sup>

Week	Topics
1	Introduction, Object Oriented Design
2	Programming Abstractions, Abstract Data Types
3	Architectural Design Patterns
4	Complex Data Structures
5-7	Design Patterns
8-11	Concurrency
12-15	Distributed Programming

## Grading

- 85% Projects
- 15% Lecture, lab exercises, and participation

## Working Together

Working together and helping one another on all projects (but not on exams and quizzes) is highly encouraged. This includes discussion of *project specification*, *algorithms*, *data structures*, and *test cases*. It does not include code. Each person must author his or her own code.

When trying to track down a bug, it is sometimes helpful to have someone else have a look. It is acceptable to show someone else your code for this purpose, preferably one of the instructors or a tutor. It is *not* acceptable to look at someone else's solution before submitting your own.

## Cheating

Cheating will be dealt with very harshly, and includes, but is not limited to:

- Copying code from another person or having someone else write your code.

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<sup>1</sup>Subject to change

- Copying code from the Internet or another source. (If there's some code that you would really, really like to use, please check with us before you do it.)
- *Using generative AI to create your code.*
- Attempting to disassemble, decompile, or otherwise reverse engineer compiled example programs.
- Allowing another person to copy your code.
- Leaving your code (paper or electronic copies) where others can find it. You are responsible for the security of your intellectual property.
- Use of external libraries other than those included with Java without documenting it. *Note: If you do document usages of external libraries, it will not be considered cheating. However, you still might not receive full marks if the library covers too much of the assignment. It is best to check with one of the instructors before using an external library.*
- Violation of copyright or license agreements on external libraries. If you use external library code, it is your responsibility to understand and comply with the appropriate copyright and license issues.
- Violation of the University policy on acceptable computer use.

Not being able to explain how some significant part of your code works will result in a zero for the assignment. It does not matter if the reason you do not understand your code is because you did not do the work or because you got your code working by trial and error. If I suspect someone of cheating, the first thing I do is ask that person to explain the code. This is not a quiz you ever want to fail. Too much code in the real world is built and maintained by trial and error. It makes for a house of cards. It is not a good way to produce code nor is it a good way to learn.

## Computer Science Advisement

Whether or not you have been officially admitted to the CS program yet, please consult the Department of Computer Science Undergraduate Advisor with any questions you may have. This is especially important when navigating the prerequisites for certain courses and resolving scheduling issues. More general university advisors are not always familiar with the details of the computer science program.

## Computer Science Department Website

I host some course files on the CS department servers. Sometimes I may make a typo in a link or set the access permissions on a file incorrectly so that it cannot be reached. In those cases, let me know and I'll fix it.

It is also possible that the entire CS department website (<http://cs.unm.edu>) is unreachable for some reason.<sup>2</sup> If that happens, I suggest you email the CS support team directly (email: [cssupport@cs.unm.edu](mailto:cssupport@cs.unm.edu)), since that will be faster than emailing me and waiting for me to see the message and email support myself. (Unfortunately, it is a bit hard to find the CS support email when the CS site is down, which is why I included here.)

## Accommodations

UNM is committed to providing equitable access to learning opportunities for students with documented disabilities. As your instructor, it is my objective to facilitate an inclusive classroom setting, in which students have full access and opportunity to participate. To engage in a confidential conversation about the process for requesting reasonable accommodations for this class and/or program, please contact Accessibility Resource Center (<https://arc.unm.edu/>) at [arcsrvs@unm.edu](mailto:arcsrvs@unm.edu) or by phone at 505-277-3506.

The ARC is there to help you. If you have a condition where you need extra time or a quiet place for exams, I strongly recommend that you take advantage of their services.

## UAP 2720 and 2740

Our classroom and university should always be spaces of mutual respect, kindness, and support, without fear of discrimination, harassment, or violence. If you ever need assistance or have concerns about incidents that violate this principle, please access campus support resources. These include confidential services at LoboRESPECT Advocacy Center, the Women's Resource Center, and the LGBTQ Resource Center. The University of New Mexico prohibits discrimination on the basis of sex (including gender, sex stereotyping, gender expression, and gender identity). UNM faculty and graduate teaching assistants are considered "responsible employees." "Responsible employees" must communicate reports of sexual harassment, sexual misconduct and sexual violence to Compliance, Ethics and Equal Opportunity. For more information on the campus policy regarding sexual misconduct, reporting, and reporting for "responsible employees," please see UAP 2720 and UAP 2740.

Confidential services for students are available at LoboRESPECT Advocacy Center, Women's Resource Center, and the LGBTQ Resource Center. The Women's Resource Center supports all students, including those who are pregnant or are parents. UNM Pregnancy and Parenting Support information is available.

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<sup>2</sup>or sometimes the main site is up, but the faculty pages are all down because they're on a separate server

## Credit Hour Statement

This is a four credit-hour course. Please plan for a *minimum* of eight hours of out-of-class work (or homework, study, assignment completion, and class preparation) each week.

Resources to support study skills and time management are available through Student Learning Assistance at the Center for Teaching and Learning in Zimmerman Library or online.

## Land Acknowledgement

Founded in 1889, the University of New Mexico sits on the traditional homelands of the Pueblo of Sandia. The original peoples of New Mexico Pueblo, Navajo, and Apache since time immemorial, have deep connections to the land and have made significant contributions to the broader community statewide. We honor the land itself and those who remain stewards of this land throughout the generations and also acknowledge our committed relationship to Indigenous peoples. We gratefully recognize our history.

<https://diverse.unm.edu/education-and-resources/programs/index.html>

## Citizenship and/or Immigration Status

All students are welcome in this class regardless of citizenship, residency, or immigration status. Your instructor will respect your privacy if you choose to disclose your status. UNM as an institution has made a core commitment to the success of all our students, including members of our undocumented community. The Administration's welcome is found on our website: <http://undocumented.unm.edu/>

## Responsible Learning and Academic Honesty

Cheating and plagiarism (academic dishonesty) are often driven by lack of time, desperation, or lack of knowledge about how to identify a source. Communicate with me and ask for help, even at the last minute, rather than risking your academic career by committing academic dishonesty. Academic dishonesty involves claiming that work created by another source is your own original work. It is a Student Code of Conduct violation that can lead to a disciplinary procedure. When you use a resource in work submitted for this class, document how you used it and distinguish clearly between your original work and the material taken from the resource.

Many students have found that time management workshops or work with peer tutors can help them meet their goals. These and other resources, including support on how to cite a source, are available through Student Learning Assistance at the Center for Teaching and Learning.

## Generative AI Use

We treat AI-based assistance, such as ChatGPT and Github Copilot, the same way we treat collaboration with other people: you are welcome to talk about your ideas and work with other people, both inside and outside the class, as well as with AI-based assistants. However, all work you submit must be your own. You should never include in your assignment anything that was not written directly by you without proper citation (including quotation marks and in-line citation for direct quotes). Including anything you did not write in your assignment without proper citation will be treated as an academic misconduct case.

If you are unsure where the line is between collaborating with AI and copying from AI, we recommend the following heuristics:

- Never hit “Copy” within your conversation with an AI assistant. You can copy your own work into your conversation, but do not copy anything from the conversation back into your assignment. Instead, use your interaction with the AI assistant as a learning experience, then let your assignment reflect your improved understanding.
- Do not have your assignment and the AI agent itself open on your device at the same time. Similar to above, use your conversation with the AI as a learning experience, then close the interaction down, open your assignment, and let your assignment reflect your revised knowledge. This heuristic includes avoiding using AI assistants that are directly integrated into your composition environment: just as you should not let a classmate write content or code directly into your submission, so also you should avoid using tools that directly add content to your submission.

Deviating from these heuristics does not automatically qualify as academic misconduct; however, following these heuristics essentially guarantees your collaboration will not cross the line into misconduct.

## Connecting to Campus and Finding Support

UNM has many resources and centers to help you thrive, including opportunities to get involved in campus life, research experiences, mental health resources, academic support such as tutoring, resource centers for people like you, free food at Lobo Food Pantry, jobs on campus and financial capability support. Your advisor, staff at the resource centers and Dean of Students, and I can help you find the right opportunities for you.

## Wellness

If you do need to stay home due to illness or are experiencing a wellness challenge, please take advantage of the resources below. If you need to stay home, please contact me and I can work with you to provide alternatives for course participation and completion. Let me, an advisor, or another UNM staff member know that you need support so that we can connect you to the right resources. UNM is a mask friendly, but not a mask required, community. If you are experiencing COVID-19 symptoms, please do not come to class.

Student Health and Counseling (SHAC) at (505) 277-3136.

TimelyCare: Free 24/7 virtual care services (medical, emotional support, health coaching, self-care, basic needs support).

LoboRESPECT Advocacy Center (505) 277-2911: help with contacting faculty and managing challenges that impact your UNM experience.