

University of Oklahoma Computer Science
CS 4213: SOFTWARE DESIGN PATTERNS
Fall 2025

Course Format/Meeting Time and Location

Class Instructor: [Mansoor Abdulhak](#) & Class TA: [Ajisegiri SJ](#)

Class meetings: MWF 9:00 am – 9:50 am

Class location: Sarkeys Energy Ctr M0204

Final Exam: Dec 16, 8:00 am - 10:00 am at Sarkeys Energy Ctr M0204 on Tuesday,

Student/Office Hours

MWF 9:55 am – 10:55 am, DEH 234 or [Online](#)

Student hours are for you. They are times in which you may ask questions about course content, delve deeper into the topic through conversation with me, share concerns you have about the course, and/or explore career or graduate school opportunities with me in this field. I often hear from students that they don't want to interrupt my time in my office, but please know that I want you to come by! In addition to our class time together, these hours not only help you but help me to know the questions my students have so that I may adjust my teaching approach as needed.

Learning Management System/website

This class will use Canvas software for our home page. The URL for the home page is <http://canvas.ou.edu>. Login with your 4+4 using your standard OU password. If you have difficulty logging in, call 325-HELP. This software provides a number of useful features, including a list of assignments and announcements, an electronic mailing list, and grade book. The Canvas course site will be used for all updates. You should check the site regularly.

Course Prerequisite

CS 3203 Software Engineering

Course Description

This course is intensive exploration of software design patterns, delving into their descriptions, underlying design principles, and utilized techniques. This hands-on course will equip students with the skills to apply these patterns to real-world design challenges.

Learning Outcomes

- ASO 1 Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.
- ASO 2 Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.
- ASO 3 Communicate effectively in a variety of professional contexts.

Texts and Materials

- Required 1 David Kung. (2024). Software Engineering, 2nd Edition. McGraw Hill.
- Supplementary 2 Pressman, R. S., & Maxim, B. R. (2019). Software Engineering: A Practitioner's Approach.
- Supplementary 3 Sommerville, I. (2015). Software Engineering. Addison-Wesley.

Teaching Philosophy & Inclusion Statement

My teaching methods include a variety of up-to-date techniques including active participation via an inverted classroom and experiential learning through project-based instruction and assessment. Through these methods, I seek to make courses imitate the work environment as much as possible in order to best prepare students for their careers.

Learning Activities, Assignments, and Assessments

During the semester, students will have:

- Class activities: The course schedule includes weekly readings. While you are free to study ahead, following the schedule will ensure you are prepared for in-class activities and homework assignments. These activities are in-class submission.
- Assignments: Homework assignments will give you the opportunity to develop essential course skills and assess your understanding of the material. Each assignment instructions, along with its duration, will be posted on the course Canvas page. It will be assessed on the student's submission.
 - This course is highly practical, consisting of 4 assignments, each focused on a different design pattern. For each assignment, you will design your product using a specific design pattern, allowing you to explore the differences between them and understand the types of solutions they offer.
- Project: The project is central to the course, designed to provide hands-on practice. Case studies for the project will be posted on the course Canvas page. There will be an intermediate milestone to offer feedback and allow for iteration. The project assessment will be scaled for each individual based on the submission and the 360 feedback of teamwork.
 - For the project, you will be required to select the best design pattern from your assignments and develop a prototype of your product using the chosen design pattern.
- Midterm & Final Exam: The exam will assess your overall understanding of the course material and the skills you've developed throughout the semester. Detailed information, including the format and schedule, will be posted on the course Canvas page. It will be assessed on the student's submission.

Assessments

Methods	Quantity	Weighting
Assignments	4	60%
Midterm Exam	1	10%
Project	1	10%
Final Exam	1	20%

Assigning Grades

The final letter grading for the course will be as follows: A \geq 90%, B = 75-89%, C = 60-74%, D = 50-59%, F = < 50%. The instructor will round all averages to two significant figures (69.5 will round to 70 and 69.4 will round to 69) to determine the student's letter grade in the course (70 = C, 69 = D). Canvas is equipped with a grade book that preserves the raw data utilized for computing your course grade. It is crucial that you routinely verify the accuracy of your recorded grades. In the event of any identified discrepancies or disagreement, promptly notify me, and I shall promptly address and rectify the matter.

Tentative Schedule

Week	Topic	Reading Chapters	Assessment Method	Total Marks
1	System Engineering	"3.4 System Architectural Design 3.5 Subsystems Development"		
2	Introduction to software design patterns	"10.1 What are Design Patterns? 10.2 Why Design Patterns? 10.3 Categories of Patterns"		
3	Introduction to software design patterns	"10.4 Pattern Specification 10.5 The Controller Pattern"		
4	Introduction to software design patterns	"10.6 The Expert Pattern 10.7 The Creator Pattern"		
5	Modeling and Design of Event-Driven Systems	"13.1 What is Object State Modeling 13.2 Why Object State Modeling 13.4 Steps for Object State Modeling"		
6	Modeling and Design of Event-Driven Systems	"13.5 The State Pattern 13.6 Real-Time System Modeling and Design 13.7 Applying Agile Principles 13.8 Tool Support for Object State Modeling"	"Assignment 1 State " Due End of week 7	15
7	Activity Modeling for	"14.1 What is Activity Modeling 14.3 Activity Modeling:		

	Transformational Systems	Technical Background 14.5 Steps for Activity Modeling"		
8	Modeling and Design of Rule-Based Systems	"15.1 What is Decision Table 15.3 Systematic Decision Table Construction 15.9 Decision Trees 15.10 Applying The Interpreter Pattern"		
9	Applying Pattern to Design a State Diagram Editor	"16.1 Techniques used by patterns 16.2 Process for applying patterns 16.3 Case Study: State Diagram Editor"	Midterm	10
10	Applying Pattern to Design a State Diagram Editor	"16.4 Working with Complex Structures 16.5 Object Creation for Different Design Objectives"	"Assignment 2 Composite " Due End of week 12	15
11	Applying Pattern to Design a State Diagram Editor	"16.6 Designing Graphical User Interface and Display 16.7 Applying Agile Principles"		
12	Applying Pattern to Design a Persistence Framework	"17.1 Problems with Direct Database Access 17.2 Hiding Persistence Storage with. Bridge 17.3 Encapsulating Database Request as Commands Benefits of the Command Pattern"	"Assignment 3 Command "Due End of week 14	15
13	Applying Pattern to Design a Persistence Framework	"17.4 Hiding Network Communication with Remote Proxy 17.5 Sharing Common Code with Template Method Benefits of the Template Method Pattern"	"Assignment 4 Discuss Pattern "Due End of week 15	15
14	Applying Pattern to Design a Persistence Framework	"17.6 Retrieving Different Objects with Factory Method 17.7 Reducing Number of Classes with Prototype Benefits and Liability of the Prototype Pattern"		
15	Final Week	Final Week	"Project Prototype" Due End of week 15	10
16	Exam	Exam	Exam	20

Course Policies:

Make-up Policy

Unless explicitly stated otherwise specified in writing, please ensure all assignments are submitted by the designated date in the Ticket instructions. In the event of a delay, a 10% deduction will be applied for each day beyond the specified deadline. This policy is in place to maintain fairness and consistency. It's worth noting that, as software engineering professionals, it's our responsibility to ensure timely submission, avoiding any delays that may result in fines for our workplace. Make-up exams will not normally be permitted, and they are only available when required by university policy.

Absences

This course follows a synchronous format, requiring your attendance at all scheduled class sessions and labs in person. Exceptions are made for illness, unforeseen caretaking duties. I do not take attendance in class, while presentations will be scheduled during the class meeting time, and they should be done in person.

Technology

In recognizing the lasting impact of AI tools, I encourage their use to improve your skills on using them. However, given that AI tools are not fully matured, it is the responsibility of the student to evaluate the content generated and learn how to effectively work with AI tools to achieve optimal results. This approach reflects our commitment to adapting and utilizing emerging technologies responsibly in the learning environment. It is essential to note that any direct copy-pasting without reading, understanding, analyzing, and actively working to enhance your skills will be considered academic misconduct.

Land Acknowledgement Statement Provided by OU's Tribal Liaison office

Long before the University of Oklahoma was established, the land on which the University now resides was the traditional home of the "Hasinai" Caddo Nation and "[Kirikir?i:s](#)" (audio available when opened in Chrome) Wichita & Affiliated Tribes.

We acknowledge this territory once also served as a hunting ground, trade exchange point, and migration route for the Apache, Comanche, Kiowa and Osage nations. Today, 39 tribal nations dwell in the state of Oklahoma as a result of settler and colonial policies that were designed to assimilate Native people. The University of Oklahoma recognizes the historical connection our university has with its indigenous community. We acknowledge, honor and respect the diverse Indigenous peoples connected to this land. We fully recognize, support and advocate for the sovereign rights of all of Oklahoma's 39 tribal nations. This acknowledgement is aligned with our university's core value of creating a diverse and inclusive community. It is an institutional responsibility to recognize and acknowledge the people, culture and history that make up our entire OU Community.

University Policies

Mental Health Support Services

Support is available for any student experiencing mental health issues that are impacting their academic success. Students can either be seen at the University Counseling Center (UCC) located on the second floor of Goddard Health Center or receive 24/7/365 crisis support from a licensed mental health provider through [TELUS Health](#). To schedule an appointment or receive more information about mental health resources at OU please call the UCC at 405-325-2911 or visit [University Counseling Center](#). The UCC is located at 620 Elm Ave., Room 201, Norman, OK 73019.

Title IX Resources and Reporting Requirement

The University of Oklahoma faculty are committed to creating a safe learning environment for all members of our community, free from gender and sex-based discrimination, including sexual harassment, domestic and dating violence, sexual assault, and stalking, in accordance with Title IX. There are resources available to those impacted, including: speaking with someone confidentially about your options, medical attention, counseling, reporting, academic support, and safety plans. If you have (or someone you know has) experienced any form of sex or gender-based discrimination or violence and wish to speak with someone confidentially, please contact [OU Advocates](#) (available 24/7 at 405-615-0013) or [University Counseling Center](#) (M-F 8 a.m. to 5 p.m. at 405-325-2911).

Because the University of Oklahoma is committed to the safety of you and other students, and because of our Title IX obligations, I, as well as other faculty, Graduate Assistants, and Teaching Assistants, are mandatory reporters. This means that we are obligated to report gender-based violence that has been disclosed to us to the Institutional Equity Office. This means that we are obligated to report gender-based violence that has been disclosed to us to the Institutional Equity Office. This includes disclosures that occur in: class discussion, writing assignments, discussion boards, emails and during Student/Office Hours. You may also choose to report directly to the Institutional Equity Office. After a report is filed, the Title IX Coordinator will reach out to provide resources, support, and information and the reported information will remain private. For more information regarding the University's Title IX Grievance procedures, reporting, or support measures, please visit [Institutional Equity Office](#) at 405-325-3546.

Reasonable Accommodation Policy

The University of Oklahoma (OU) is committed to the goal of achieving equal educational opportunity and full educational participation for students with disabilities. If you have already established reasonable accommodations with the Accessibility and Disability Resource Center (ADRC), please [submit your semester accommodation request through the ADRC](#) as soon as possible and contact me privately, so that we have adequate time to arrange your approved academic accommodations.

If you have not yet established services through ADRC, but have a documented disability and require accommodations, please complete [ADRC's pre-registration form](#) to begin the registration process. ADRC facilitates the interactive process that establishes reasonable accommodations for students at OU. For more information on ADRC registration procedures, please review their [Register with the ADRC](#) web page. You may also contact them at (405)325-3852 or adrc@ou.edu, or visit www.ou.edu/adrc for more information.

Note: disabilities may include, but are not limited to, mental health, chronic health, physical, vision, hearing, learning and attention disabilities, pregnancy-related. ADRC can also support students experiencing temporary medical conditions.

Religious Observance

It is the policy of the University to excuse the absences of students that result from religious observances and to reschedule examinations and additional required classwork that may fall on religious holidays, without penalty. [\[See Faculty Handbook 3.15.2\]](#)

Adjustments for Pregnancy/Childbirth Related Issues

Should you need modifications or adjustments to your course requirements because of documented pregnancy-related or childbirth-related issues, please contact the Accessibility and Disability Resource Center at 405/325-3852 and/or the Institutional Equity Office at 405/325-3546 as soon as possible. Also, see the Institutional Equity Office [FAQ on Pregnant and Parenting Students' Rights](#) for answers to commonly asked questions.

Final Exam Preparation Period

Pre-finals week will be defined as the seven calendar days before the first day of finals. Faculty may cover new course material throughout this week. For specific provisions of the policy please refer to OU's [Final Exam Preparation Period policy](#).

Emergency Protocol

During an emergency, there are official university [procedures](#) that will maximize your safety.

Severe Weather: If you receive an OU Alert to seek refuge or hear a tornado siren that signals severe weather.

1. Look for severe weather refuge location maps located inside most OU buildings near the entrances.
2. Seek refuge inside a building. Do not leave one building to seek shelter in another building that you deem safer. If outside, get into the nearest building.
3. Go to the building's severe weather refuge location. If you do not know where that is, go to the lowest level possible and seek refuge in an innermost room. Avoid outside doors and windows.
4. Get in, Get Down, Cover Up
5. Wait for official notice to resume normal activities.

Additional [Weather Safety Information](#) is available through the Department of Campus Safety.

The University of Oklahoma Active Threat Guidance

The University of Oklahoma embraces a Run, Hide, Fight strategy for active threats on campus. This strategy is well known, widely accepted, and proven to save lives. To receive emergency campus alerts, be sure to update your contact information and preferences in the account settings section at one.ou.edu.

RUN: Running away from the threat is usually the best option. If it is safe to run, run as far away from the threat as possible. Call 911 when you are in a safe location and let them know from which OU campus you're calling from and location of active threat.

HIDE: If running is not practical, the next best option is to hide. Lock and barricade all doors; turn off all lights; turn down your phone's volume; search for improvised weapons; hide behind solid objects and walls; and hide yourself completely and stay quiet. Remain in place until law enforcement arrives. Be patient and remain hidden.

FIGHT: If you are unable to run or hide, the last best option is to fight. Have one or more improvised weapons with you and be prepared to attack. Attack them when they are least expecting it and hit them where it hurts most: the face (specifically eyes, nose, and ears), the throat, the diaphragm (solar plexus), and the groin.

Please save OUPD's contact information in your phone.

NORMAN campus: *For non-emergencies call (405) 325-1717. For emergencies call (405) 325-1911 or dial 911.*

TULSA campus: *For non-emergencies call (918) 660-3900. For emergencies call (918) 660-3333 or dial 911.*

Fire Alarm/General Emergency

If you receive an OU Alert that there is danger inside or near the building, or the fire alarm inside the building activates:

1. *LEAVE* the building. Do not use the elevators.
2. *KNOW* at least two building exits
3. *ASS/ST* those that may need help

4. *PROCEED* to the emergency assembly area
5. *ONCE safely outside, NOTIFY first responders of anyone that may still be inside the building due to mobility issues.*
6. *WAIT* for official notice before attempting to re-enter the building.

Video: [OU Fire Safety on Campus](#)

Office of Access and Opportunity's Belonging Statement

Why You Belong at the University of Oklahoma: The University of Oklahoma fosters an inclusive culture of respect and civility, belonging, and access, which are essential to our collective pursuit of excellence and our determination to change lives. The unique talents, perspectives, and experiences of our community enrich the learning, and working environment at OU, inspiring us to harness our innovation, creativity, and collaboration for the advancement of people everywhere.

Course Reflection Survey

You'll receive a Course Reflection Survey at the end of each semester for each course that you are enrolled in. I strongly encourage you to complete this survey. Your feedback can help me adjust my class for future semesters to help other students be successful. Your feedback is confidential and I will only receive it after final grades are due. Course Reflection Survey results may also factor into teaching evaluations and annual performance reviews and are shared with department and program chairs.

Copyright Syllabus Statement for In-Person or Online Courses

Sessions of this course may be recorded or live-streamed. These recordings are the intellectual property of the individual faculty member and may not be shared or reproduced without explicit, written consent of the faculty member. In addition, privacy rights of others such as students, guest lecturers, and providers of copyrighted material displayed in the recording may be of concern. Students may not share any course recordings with individuals not enrolled in the class or upload them to any other online environment.

Pre-Finals Week Policies

During pre-finals week, all normal class activities will continue; however, no assignment, test, or examination accounting for more than 3% of the course grade may be assigned, unless it is assigned in advance of pre-finals week and worth less than 10%, or scheduled at least 30 days prior if worth more than 10%. No activity or field trip may be scheduled that conflicts with another class.