

Software Engineering

COMP 4081, Fall 2024

Tuesday, Thursday 2:40-4:05 p.m.
Dunn Hall 233

Please send all emails to all instructors and TAs, and reply-all to all emails.

Instructor: Kathryn Bridson <kbridson@memphis.edu>

Office Hours: By appointment; no set hours, but I will make every effort to respond to messages within one business day

Office: Dunn Hall 303; meetings held in Teams or in person by appointment

Teaching Assistant: Wang Li <wli5@memphis.edu>

1 Catalog Description

COMP 4081 - Software Engineering (3)

Scope of software engineering; software life cycle models; software process; team organization; requirements analysis and design methodologies; metrics, inspections, testing strategies, and maintenance; software risks; professional and ethical responsibilities. Computer Science majors should plan to take COMP 4882 during the following spring semester. It is recommended that students take COMP 3115 before taking this course. PREREQUISITE: COMP 2150, permission of instructor.

2 Topics

The course will emphasize the following topics (a subset of the knowledge areas in the [Guide to the Software Engineering Body of Knowledge](#)):

- **Software Requirements**, including elicitation, specification, and validation
- **Software Design**, including principles, methods, patterns, and notations
- **Software Construction**, including tools, platforms, and APIs
- **Software Testing**, including levels, techniques, and measures
- **Software Maintenance**, including types and cost
- **Software Configuration Management**, including version control
- **Software Engineering Management**, including planning and estimation
- **Software Engineering Process**, including life-cycle models and assessment
- **Software Engineering Models and Methods**, including information modeling, analysis, and Agile methods

3 Course Outcomes

The following are some key learning goals that students in the course are expected to achieve:

1. Use modern software development tools (e.g., Git) for effective configuration management.
2. Design and model software using modern modeling languages and notations (e.g., UML).
3. Convey ideas orally through presentations to peers, clients, and faculty.
4. Gather and specify software requirements (e.g., as user stories).
5. Apply a modern software engineering process (e.g., Scrum) to developing a software project.
6. Produce high-quality software development artifacts for each phase of the development cycle.
7. Apply modern software testing tools and techniques (e.g., black- and white-box testing).
8. Develop software in collaborative teams.
9. Plan work and distribute tasks among team members to maximize team productivity.

4 Required Equipment

Students will be required to bring a laptop computer to lecture and to have a computer to do the work required for the course.

System Requirements:

- Must have a working webcam and microphone.
- Must be capable of simultaneously recording screen capture and webcam video while running Rails web development tools.

It is the student's responsibility to have and maintain a working laptop development environment to use for this class.

5 Required Textbooks

There are no required textbooks for this course. The instructor will provide all reading materials.

6 Evaluation

Grading weights are as follows:

- 30% Rails Skills Assignments (6 assignments @ 5% each)
- 15% Software Design Assignments (3 assignments @ 5% each)
- 5% Participation Activities
 - 1% Prior Knowledge Check
 - Skills & Knowledge Tests (2 test sessions @ 2% each)
- 50% Team Project
 - 25% Team Achievement
 - 7% Milestone 0 (Initial Planning)
 - 4% Milestone 1
 - 4% Milestone 2

- 10% Final-Product Evaluation
- 25% Individual Productivity
 - 10% Milestone 1 Regular Productivity
 - 10% Milestone 2 Regular Productivity
 - 5% Above and Beyond Productivity

To convert from percentages to letter grades, see the following table:

≥ 97%	91–96%	89–90%	87–88%	81–86%	79–80%	77–78%	71–76%	69–70%	67–68%	60–66%	≤ 59%
A+	A	A-	B+	B	B-	C+	C	C-	D+	D	F

I reserve the right to *lower* the percentage threshold for letter grades as I see fit (i.e., I may make the grading scale better for you but never worse).

6.1 Skills Assignments

The Rails Skills Assignments will have students perform actual coding tasks using their laptop software development environments. A key aim of these Skills Assignments is to help students acquire the skills needed to perform core development tasks quickly and correctly. Such skill and efficiency are essential for an effective software development team member.

- There will generally be three activities in each Skills Assignment with separate due dates throughout the week:
 - **Active Reading:** Read and perform the steps in the specified development demos. Instructor videos will be provided for each demo to guide you through the process.
 - **Practice Task:** Complete a practice task that combines the concepts from all demos in the Active Reading activity. An instructor solution video will be provided after you have attempted the task, allowing you to review and understand the correct approach.
 - **Explanation Video:** Record yourself performing a task that is similar (isomorphic) to the Practice Task. While recording, explain each step of your solution as you perform it, demonstrating your understanding of the material.
- Each Skills Assignment activity will be graded separately as pass/fail (i.e., no partial credit).
- Students must pass all assigned activities in a Skills Assignment to receive any credit for that assignment.
- Students must complete all parts on time. I do not accept late work; however, I will grant extensions in extreme cases if (1) you ask before the posted due date/time and (2) we agree on a new due date (generally, only 1-2 additional days).
- Students who fail an activity for any reason (e.g., did not submit on time, missing requirements) on the first attempt will get one additional try. The second attempt Canvas assignment will open when the grades for the first attempt are posted and will be due by a specified date.
- Students can request an additional attempt on a single activity from one of the Skills Assignments after the due date for that activity has passed. This extra attempt is a one-time-only exception that can be used at any point before exam week.

6.2 Software Design Assignments

The Software Design Skills Assignments will focus on critical aspects of software design, emphasizing analysis, modeling, and the application of design patterns. These assignments are not coding tasks but will require students to engage deeply with design principles and methodologies, either individually or in groups. The primary aim of these assignments is to develop the students' ability to think critically about design choices, effectively communicate their ideas, and collaborate on complex problems. Mastering these skills is essential for becoming a well-rounded and effective member of any software development team.

6.3 Team Project

The centerpiece of this course is a team software project. Teams of 3-4 students will work together to develop a software system for a customer.

I reserve the right to assign the teams and to reshuffle them as I see fit.

Team projects in an educational setting must balance two concerns: (1) the need for students to work together as cohesive teams and (2) the need for individual accountability. Thus, half of your project grade will be based on what your team achieves, and half will be based on your individual contributions to the project (i.e., your productivity).

6.3.1 Team Achievement

Teams will complete a series of project milestones, each with its own goals and instructions. Milestones are evaluated based on criteria which include the following:

- Quality of planning and design artifacts
- Effectiveness of communication
- Discipline in following software engineering processes and procedures

Additionally, at the end of the project, there will be a final evaluation of the product produced by the team. This evaluation will focus mainly on the quantity and quality of features built.

The score awarded for the above items will generally apply to the whole team (i.e., every team member will receive the same grade); see exceptions for low individual productivity below.

6.3.2 Individual Productivity

6.3.2.1 Regular Productivity

The majority of your individual productivity points are associated with *regular productivity*. Each team member will be assigned certain tasks for each milestone. It is expected that each team member will complete their assigned tasks in a timely manner. It is also expected that team members will be continuously productive instead of rushing to complete all their assigned tasks at the last minute. Failure to do so may result in deductions from your regular productivity grade.

6.3.2.2 Above and Beyond Productivity

To achieve the highest grades in the course (A/A+), you will need to go above and beyond the call of duty; thus, your individual productivity grade also accounts for *above and beyond productivity* (aka A&B). Throughout the course, you will have the opportunity to take on special roles or to complete bonus tasks for A&B points in addition to your regular task assignments. There is no limit on the number of A&B points you can earn, but note that you will need at least 5 A&B points to get full credit.

6.3.2.3 Additional Productivity Policies

- **Deduction for Unproductiveness:** A student who demonstrates unsatisfactory productivity may also lose points on the scores they receive for the team component of the associated milestone and the final-product evaluation. Such deductions are meant to account for the lack of contribution made by an unproductive team member to the project.
- **Late Work:** You are expected to complete work on schedule, as deadlines are a part of the real world. Individual work completed after the specified team deadline will be counted as part of the next iteration (if possible).
- **Attendance:** During the project part of the course, much of the class time will be devoted to team activities, planning discussions, and receiving feedback on your project artifacts. While I do not expect or require perfect attendance, I must be able to see you regularly interacting with your team and participating in the software engineering process to evaluate your performance on the related learning objectives.

7 Academic Integrity

The University of Memphis expects all students to behave honestly. The [Student Code of Rights and Responsibilities](#) explains what constitutes a violation of our Academic Integrity policy. For more information, please see the Office of Student Accountability's website: <https://www.memphis.edu/osa/>. Plagiarism, cheating, and other forms of academic dishonesty are prohibited. Students who violate the academic misconduct policy, either directly or indirectly, through participation or assistance, are immediately responsible to the instructor of the class in addition to other possible disciplinary sanctions which may be imposed through the regular institutional disciplinary procedures.

Examples of academic dishonesty include, but are not limited to:

- Cheating – A student uses a smart phone to access the internet while taking a quiz.
- Copyright infringement – A student uses a photograph found on the internet in a presentation without obtaining permission from the photographer.
- Deception – A student gives a dishonest excuse when asking for a deadline extension.
- Denying access to information or material – A student makes library or shared resource material unavailable to others by deliberately misplacing those resources.
- Fabrication – A student invents data in an academic work.
- Facilitating academic misconduct – A student knowingly allows a portion of their work to be used by another student.
- Plagiarism – A student represents the ideas of another in a paper without citing and referencing the work or a student turns in the same or nearly the same assignment for credit in more than one class.
- Sabotage – A student prevents others from completing their work by opening a window to affect a temperature-controlled experiment.
- Unauthorized collaboration – A student works with other students on a paper without the specific permission of the instructor.

7.1 Course-Specific Policies

- ***As per department policy, any student caught cheating in the course will receive at minimum a 0 grade on the assignment/test and be reported to the [Office of Student Accountability](#).***
- Teammates (i.e., members of the same team) may collaborate and share work however they see fit; however, if asked to report each team member's contributions, students must provide honest responses.
- Students from different teams may not collaborate in this way.
- Teammate collaboration is limited to project work and is not allowed on any other coursework (e.g., homework, quizzes, exams), unless expressly noted.
- ***During the project only***, students are free to use outside resources (e.g., coding blog posts or guides, YouTube tutorials, generative AI, etc.) to help complete assigned coding tasks. However, ***you must credit all sources and collaborators***. Failure to do so will be considered cheating.

8 Classroom Behavior

Students should be aware of the [Student Code of Rights and Responsibilities](#) which describes examples of unacceptable classroom behavior. Disruptive classroom behavior will not be tolerated. Instructors are empowered to remove students from class and refer behaviors for sanctioning to the Office of Student Accountability.

9 Equity, Inclusion, and Accommodations

Our class respects all forms of diversity. The University of Memphis embraces the diversity of students, faculty, and staff, honors the inherent dignity of each individual, and welcomes their unique perspectives, behaviors, and worldviews. In this course, people of all races, religions, national origins, sexual orientations, ethnicities, genders and gender identities, cognitive, physical, and behavioral abilities, socioeconomic backgrounds, regions, immigrant statuses, military or veteran statuses, size and/or shapes are strongly encouraged to share their rich array of perspectives and experiences. Course content and campus discussions will heighten your awareness to each other's individual and intersecting identities. In accordance with [UofM Policy GE2004](#), the University will ensure students receive consistent and fair treatment and affirmation of the University's commitment to diversity. The University prohibits discrimination and harassment based on protected characteristics as stated in [UofM Policy GE2030](#).

Please see the instructor if you need accommodations for a disability, or to fulfill cultural or religious obligations. Students with requests for accommodations should contact [Disability Resources for Students](#) to register and learn about the services available to support their learning. Students with disabilities are encouraged to speak with us privately about academic and classroom accommodations. It is strongly encouraged that you register with Disability Resources for Students (DRS) to determine appropriate academic accommodations. Disability Resources for Students is located in 110 Wilder Tower, their phone number is (901) 678-2880 (V/TTY), their email is drs@memphis.edu, and their website is <https://www.memphis.edu/drs/>. Disability Resources for Students coordinates all accommodations for students with disabilities.

Qualified students with disabilities will be provided reasonable and necessary academic accommodations if determined eligible by the appropriate Disability Resources for Students

staff at the University. Prior to granting disability accommodations in this course, the instructor must receive written verification of a student's eligibility for specific accommodations from the Disability Resources for Students staff at the University. It is the student's responsibility to initiate contact with University's Disability Resources for Students staff and to follow the established procedures for having the accommodation notice sent to the instructor.

10 Mental Health

As a student you can sometimes feel overwhelmed, lost, experience anxiety or depression, and struggle with relationship difficulties or diminished self-esteem. Mental health challenges can interfere with optimal academic performance. However, many of these issues can be effectively addressed with some help. If you find yourself struggling with your mental or physical health this semester, please feel free to approach me. I will try to be flexible and accommodating. As your instructor, I am not qualified to serve as a counselor, but UofM offers confidential counseling services on-campus and via telehealth that are available to students taking six or more credits at no cost. UofM Counseling Center is staffed by experienced, professional psychologists, clinical social workers, and counselors, who are attuned to the needs of college students. I strongly encourage you to take advantage of this valuable resource. To connect with Counseling Center services, please visit 211 & 214 Wilder Tower, or call 901.678.2068. To know more about their services, you can visit their website at <https://www.memphis.edu/counseling>. In a crisis situation, please call 901.678.HELP (4357) to speak to the On-call counselor. Remember, getting help is an intelligent and courageous thing to do -- for yourself and for those who care about you.

11 Personal or Academic Challenges including Food & Housing Insecurity

If you are experiencing personal or academic challenges including, but not limited to food or housing issues, family needs, or other stressors, please visit the [Dean of Students Office](#) to learn about resources that can help. Any student who faces personal challenges including, but not limited to securing their food or housing and believes this may affect their performance in the course is urged to contact the [Dean of Students Office](#) at 901.678.2187 located in the University Center, Suite 359 for assistance. If you are comfortable doing so, please also let the instructor know you are experiencing challenges as they may be able to assist you in connecting with campus or community supports.

12 Personal Relationships

There are special problems in any personal relationship between individuals where one party possesses direct academic, administrative, supervisory, evaluative, counseling or extracurricular authority over the other party. Such positions include, but are not limited to, teacher and student or assistant, supervisor and employee, senior faculty and junior faculty, mentor and trainee, advisor and advisee, counselor and client, teaching assistant and student, coach and athlete, and the individuals who supervise the day-to-day student living environment and student residents.

In accordance with [UofM Policy HR5050](#), no University employee shall enter into or maintain any personal relationships with students or with employees over whom they exercise or, reasonably can expect to exercise, direct or indirect control in areas such as academics,

administration, supervision, evaluation, counseling or extracurricular authority or influence. No University employee shall exercise any direct or indirect control in the areas of academics, administration, supervision, evaluation, counseling or extracurricular authority over any student or employee with whom that employee had previously been involved in a personal relationship.

Any employee, including faculty, who is currently in a personal relationship or becomes involved in a personal relationship that might be covered by terms of this policy, must disclose the relationship immediately to Human Resources-Employee Relations and Engagement so that any and all steps are taken to comply with this policy.