Syllabus

CS 427 Software Engineering I

Course Description

This course introduces students to software engineering, focusing on principles, processes, and techniques of conducting software engineering tasks related to constructing, maintaining, and testing software. By the end of the course, students will be able to explain what processes or techniques are available for conducting a software engineering task and choose appropriate processes or techniques for such a task in the given application context. Students can apply appropriate techniques for a software engineering task in the given application context.

Course Goals and Objectives

Upon successful completion of this course, you will be able to:

- Explain what processes or techniques are available for conducting a software engineering task.
- Choose appropriate processes or techniques for such tasks in the given application context.
- Apply appropriate techniques for a software engineering task in the given application context.

Course Outline

This course is 16 weeks long.

Week	Topics
1	History of Software Engineering, Subareas of Software Engineering
2	Plan-driven methodologies, agile methodologies, process choosing, configuration management 4th Credit Hour: Start Choosing Book
3	Requirement solicitation, Requirement specification, Use-case requirements, User-story requirements MP 1: Java and Build System Basics
4	Software architecture and design
5	Object-oriented design I Project: Milestone 1
6	Object-oriented design II MP 2: Design Patterns

7	Software testing: Black-box testing, White-box testing Project: Milestone 2
8	Software testing MP 3: Testing (to not be due right before or during the break, the deadline is **xxxx** (this year)
9	Spring Break
10	Work on the project Project: Milestone 3
11	Software Debugging: Bug Reporting, Logging, Delta Debugging MP 4: Debugging
12	Work on the project Project: Milestone 4
13	Software Maintenance: Software metrics, Code smells, Refactoring, Regression testing MP 5: Code Smells and Static Analysis
14-15	Work on the project Project: Milestone 5 4th Credit Hour: Submit Book Report (may be Friday before Monday)
16	Final exam (after Reading Day)

Assignment Deadlines and Late Policy

- Each assignment activity has a specified deadline. Unless stated otherwise, all assignments are due at **11:59 PM CT** on the due date. (Time Zone Converter).
- Late submission is only accepted if students reach out to the instructor **at least one week before the deadline**. This means we will not consider any request after the deadline. You should justify your request with evidence. Otherwise, we may not accept your request. The late penalty is -30%per week.
- Late submission for the project milestones will not be accepted.
- No assignment will be accepted after the Reading Day.

Academic Calendar

- The Graduate College at the University of Illinois maintains a Graduate College Calendar. The calendar includes important dates such as final exam dates, course registration and cancellation, and holidays.
- There is also a campus-wide calendar available.

Elements of This Course

The course is comprised of the following elements:

- **Coursera Lecture Videos [Mandatory].** Each week, the concepts you need to know will be presented through short video lectures. You may stream these videos for playback within the browser by clicking on their titles or downloading them. You may also download the slides that go along with the videos. **The videos usually total 1 to 3 hours each week.** You generally should spend at least the same amount of time digesting content in the video. The time needed to digest the content will vary based on your background.
- **Live Instructor Office Hours [Optional but highly recommended].** In addition to the instructional videos on Coursera, the instructor will have live office hours or host guest talks in most weeks. These live office hours will be on Zoom, and the recorded videos will be available on Coursera, except for private Q&A (each office hour lecture's recording and slides appear under the corresponding week's content). Attending these office hours **is optional** but recommended as they may help the MPs and course project. *There would be no questions in the quizzes or final exam based solely on these office hours.*
- **Orientation Quiz.** The orientation quiz aims to ensure that you have gone through the orientation module and acquired the necessary information about the course before you start it. The orientation quiz is required, but it's not part of the course grading. You have unlimited attempts on the orientation quiz. You need to answer all questions correctly to pass the orientation quiz.
- **Graded Quizzes**. Most weeks conclude with graded quizzes. You will be allowed several attempts for each graded quiz, with your highest attempt score used toward your final grade. There is no time limit on how long you take to complete each attempt at the quiz. Graded quizzes will be used when calculating your final score in the class.
- **Machine Problems (MPs).** There are five MPs in this course. These machine programming assignments are called **"programming assignments"** on Coursera. Students report investing 3-6 hours on each of the programming assignments. Please read the instructions in respective weeks for more information about the programming assignments.
- **Project:** There will be one project in this course, done in a **team of 6-8 students**. There will be five milestones to complete the project. You can find an overview of the project in **Week 2**. Additional information regarding each milestone can be found in corresponding posts.
- **4th-hour credit:** For students who have registered for this course for 4 credit hours, a separate assignment will be completed that will last for several weeks.

- **Final Exam**: There will be one Final Exam in this course. The exam will be online and proctored through ProctorU. Please see the ProctorU page for more information.

Recommended Books

There will be no required book for the course. But if you are interested in additional readings, you can read the following recommended books for various aspects of the course.

Software Engineering

- Sommerville, “Software Engineering,” 9th Edition, Addison-Wesley, 2011. (Or 8th Edition or 7th Edition)
- Pressman, “Software Engineering: A Practitioner’s approach,” 7th Edition, McGraw Hill, 2010. (Or 6th Edition or 8th Edition)
- Pfleeger and Atlee, “Software Engineering: Theory and Practice,” 4th Edition, Prentice Hall, 2006.

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- Steinberg and Palmer, "Extreme Software Engineering: A Hands-On Approach," 1st Edition, Prentice Hall, 2004.

Java

If you need to brush up on your Java skills, it might be worthwhile to invest some time studying the following resources:

- Thinking in Java, 4th Edition. Excellent reference for Java - the programming language. A sample electronic copy can be found freely online.
- Introduction to Programming Using Java. The textbook was used for CS125 and is a good way to quickly brush up on your Java. However, since it is an *introduction to a programming* book, it might contain too much information on how to program in general and not enough information on the subtleties of Java.

Grading Distribution and Scale

Grading Distribution

Assignment	**Final Grade Weight (3 Credit Hours)**	**Final Grade Weight (4 Credit Hours)**
Quizzes	15%	11.25%
Programming Assignments	25%	18.75%
Project	40%	30%

Final Exam	20%	15%
4th Credit Hour	n/a	25%
Extra Credit	up to 3%	up to 3%

Your final grade will be calculated based on the activities in the table above. The course grade displayed in Coursera may not match your official final course grade. The percentages listed above differ for students registered for 3 credit hours vs. 4 credit hours. The distribution for 3 credit hours constitutes 75% of the total grade for 4 credit hours, and the remaining 25% will be graded separately based on the 4th-hour extra credit assignment. In Spring 2025, the 4th credit hour will be based on a book report, with two deadlines (choosing a book and submitting a report) in later weeks.

Grading Scale

Letter Grade	Percent Needed	Letter Grade	Percent Needed	Letter Grade	Percent Needed
A+	**reserved**	**B+**	**87%**	**C**	**73%**
A	**93%**	**B**	**83%**	**D**	**63%**
A-	**90%**	**B-**	**80%**	**F**	**Below 60%**

Student Code and Policies

A student at the University of Illinois at the Urbana-Champaign campus is a member of a University community of which all members have at least the rights and responsibilities common to all citizens, free from institutional censorship; affiliation with the University as a student does not diminish the rights or responsibilities held by a student or any other community member as a citizen of larger communities of the state, the nation, and the world. See the University of Illinois Student Code for more information.

Academic Integrity

All students are expected to abide by the campus regulations on academic integrity found in the Student Code of Conduct. These standards will be enforced, and infractions of these rules will not be tolerated in this course. Sharing, copying, or providing any part of a homework solution or code is an infraction of the University's rules on academic integrity. We will actively look for this policy's violations in homework and project submissions. Any violation will be punished as severely as possible with sanctions and penalties typically ranging from a failing grade on this assignment to a failing grade in the course, including a letter of the offending infraction kept in the student's permanent university record.

Again, a good rule of thumb: *Keep every typed word and piece of code your own*. If you think you are operating in a gray area, you probably are. If you would like clarification on specifics, please get in touch with the course staff.

Disability Accommodations

Students with learning, physical, or other disabilities should contact the instructor immediately. If you're unsure if this applies to you or think it may, please contact the instructor and Disability Resources and Educational Services (DRES) as soon as possible. You can contact DRES at 1207 S. Oak Street, Champaign, via phone at (217) 333-1970, or via email at disability@illinois.edu.

Statement on CS CARES and CS Values

All Illinois Computer Science community members - faculty, staff, and students - are expected to adhere to the CS Values and Code of Conduct. The CS CARES Committee is available as a resource to help people who are concerned about or experience a potential violation of the Code. If you experience such issues, please get in touch with the CS CARES Committee. The course staff are also available for issues related to this course.

Policy on the Use of GenAI/LLM

The students should **not** use LLMs unless explicitly stated.