

Fall 2025 COMPSCI 520: Theory & Practice of Software Engineering

Instructor: Heather Conboy

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Teaching Assistant: Mahbuba Tasmin (mtasmin@umass.edu)

Graders: Will be listed on Canvas

The lectures will be held in person on Tuesdays and Thursdays from 4:00 to 5:15 PM in Hasbrouck Addition, Room 126. They will be recorded and made available for later viewing.

Course description:

This course introduces students to the principal activities and state-of-the-art techniques involved in developing high-quality software systems. The individual and group assignments will involve performing such activities and applying these techniques.

For UMass undergraduates, the prerequisite is having taken CS320. All students should be familiar with an object-oriented programming language (e.g., C++, Java, python).

This is a 3 credit course.

Course objectives and learning outcomes:

We hope this course will provide you with new knowledge and experience with applying best practices for software development. The course will also include guest lectures about the latest software engineering research.

The topics covered are: software development processes, requirements engineering, design principles/models/patterns, best programming practices, verification & validation (e.g., manual reviews, testing), and debugging.

The course activities are:

- 3 homework assignments (individual or paired assignments)
- 3 in-class exercises (paired assignments)
- 3 project assignments (team assignments)
- Weekly participation quizzes usually about 10 in total (individual assignments)

The learning outcomes are to be able to:

- Effectively collaborate in teams to develop software applications
- Apply the entire software development process to specify, design, implement, and test a software application
- Follow software development best practices (e.g., modular design, documentation) to ensure the delivery of a high-quality software application

Course weekly schedule:

The Canvas course provides the detailed schedule in terms of lectures and assignments. This schedule is subject to change so you should check regularly for updates. The schedule is summarized below:

- **Week 1:** Course Overview, Software Development Processes
- **Week 2:** Software Requirements, Architecture & Design
- **Week 3:** Version Control, First in-class exercise applying version control
- **Week 4:** Verification & Validation, OO Design
- **Week 5:** OO Design Patterns 1, OO Design Patterns 2
- **Week 6:** UI Design, Program Comprehension // Initial project deliverables due
- **Week 7:** Software Testing 1, Second in-class exercise applying testing
- **Week 8:** Software Testing 2, Test Driven Development
- **Week 9:** Program Analysis, Automated Verification
- **Week 10:** No class – Election Day, Mid-point Project Fair
- **Week 11:** No class – Veterans’ Day, Debugging 1 // Mid-point project deliverables due
- **Week 12:** Debugging 2, Third in-class exercise applying debugging
- **Week 13:** Automated Program Repair, No class – Thanksgiving break
- **Week 14:** DevOps/MLOps, Guest Lecture
- **Week 15:** Final Project Fair // Final project deliverables due

Course resources:

- **Website:** <https://people.cs.umass.edu/~hconboy/courses/CS520>
- **Canvas:** <https://umamherst.instructure.com/courses/29568>
- **Gradescope:** <https://www.gradescope.com/courses/1063142>
- **Piazza:** <https://piazza.com/umass/fall2025/compsci520>
- **Textbooks:** None are required. Some are recommended on the course forums.

The lectures slides and recordings will be made available through Canvas. All assignments will have Q&A forums on Piazza and will be submitted through Gradescope. After the add/drop period, all students will automatically be added to Piazza and Gradescope.

Course grading:

Your success in this class is important to us. All assignments must be completed to pass this course. The Plan for success section provides additional learning resources available on campus.

- **Homeworks:** 35%
- **In-class exercises:** 30%
- **Project:** 25%
- **Participation:** 10%

The homework and in-class exercise assignments are primarily written in Java. Each student has five (5) individual extension days to use for these assignments. All team project development needs to be written in an object-oriented programming language. The team project deadlines are strict. Each student needs to complete at least 70% (usually 7 of the total 10) of the participation quizzes and pass them for full participation quiz credit. This usually means that some of the quizzes are optional (e.g., midterms week).

The final numerical cutoff for final course letter grade assignment will be made after all grading is done. The following grades may be given: A, A-, B+, B, B-, C+, C, C-, D+, D, F, PASS/SAT. The approximate grade thresholds that usually apply are: A (93-100), A- (90-92), B+ (87-89), B (83-86), B- (80-82), C+ (77-79), C (73-76), C- (70-72), D+ (67-69), D (60-66), F (0-59).

Incompletes will be granted only in exceptional cases, and only if you have completed at least half the course with a passing grade. Prior to that, withdrawal is the recommended course of action.

Course policies and statements:

Diversity & Inclusion statement:

Software engineering is at its nature a collaborative activity and it benefits greatly from diversity. We celebrate the diversity in our community and actively seek to include and listen to voices that are often silenced in the computing world. We welcome all individuals regardless of age, background, citizenship, disability, sex, education, ethnicity, family status, gender, gender identity, geographical origin, language, military experience, political views, race, religion, sexual orientation, socioeconomic status, and work experience.

Everyone has the right to be addressed by the name and pronouns that they use for themselves. You can indicate your preferred/chosen first name and pronouns on SPIRE, which appear on class rosters, or by letting me know. I am committed to ensuring that I address you with your chosen name and pronouns.

Please remember: We want to foster open discussion in this course. We will be following the [UMass guidelines for civility and respect](#). The instructor welcomes discussion of this policy, and encourages anyone experiencing concerns to speak with her.

Attendance and late submission policy:

Participation, in addition to attendance, is an expectation for all students enrolled in the course. We understand that circumstances may arise where you may need to miss a class, or submit an assignment late. Seek approval by contacting us at least 24 hours in advance (unless it's a last-minute emergency and you cannot). Medical conditions, religious or funerary events, university-related events (conference visit, athletic event, field trip, or performance), or extenuating non-academic reasons (military obligation, family illness, jury duty, automobile collision) that need extension will be accommodated with written documentation.

Collaboration policy:

Students are allowed to work together on all aspects of this class. All work in this course will be labeled as "individual" or "group" work. When the work is individual, we expect that you will complete the work on your own. You may work alongside others and discuss the work, but all writing (either natural language or code) should be yours and yours only. When the work is group-based, you will submit a single submission for your entire group, and you will all receive the same grade.

Academic honesty policy:

All work in this class must be your own or the work of your group, where appropriate. In most cases this work will consist of a written component (either natural language or code). ALL writing must be your own original work, or the joint work of your group where appropriate, and may not be copied from any source without proper attribution. Please refer to the [UMass Academic Honesty Policy and Procedures](#) for guidelines on what constitutes academic dishonesty and the sanctions that may be imposed on any student who has committed an act of academic dishonesty. If you have any questions or concerns about what constitutes cheating in this class, please ask us as soon as the question arises.

Accommodation statement:

The University of Massachusetts Amherst is committed to providing an equal educational opportunity for all students. If you have a documented physical, psychological, or learning disability on file with Disability Services (DS), you may be eligible for reasonable academic accommodations to help you succeed in this course. If you have a documented disability that requires an accommodation, please notify me within the first two weeks of the semester so that we can make appropriate arrangements. For more information, consult the Disability Services website at <http://www.umass.edu/disability/>.

Title IX statement:

In accordance with Title IX of the Education Amendments of 1972 that prohibits gender-based discrimination in educational settings that receive federal funds, the University of Massachusetts Amherst is committed to providing a safe learning environment for all students, free from all forms of discrimination, including sexual assault, sexual harassment, domestic violence, dating violence, stalking, and retaliation. This includes interactions in person or online through digital platforms and social media. Title IX also protects against discrimination on the basis of pregnancy, childbirth, false pregnancy, miscarriage, abortion, or related conditions, including recovery. There are resources here on campus to support you. A summary of the available Title IX resources (confidential and non-confidential) can be found at the following link: <https://www.umass.edu/titleix/resources>. You do not need to make a formal report to access them. If you need immediate support, you are not alone. Free and confidential support is available 24 hours a day / 7 days a week / 365 days a year at the SASA Hotline 413-545-0800.

Plan for success:

We all learn differently and bring different strengths and needs to the class. If there are aspects of the course that prevent you from learning, or make you feel excluded, please let us know as soon as possible. Together, we will develop strategies to meet both your needs and the requirements of the course. There are also a range of other resources available on campus, including:

- Assistive Technology: <https://www.umass.edu/it/assistive>
- Center for Counseling and Psychological Health: <https://www.umass.edu/counseling/>
- CICS Advising: <https://www.cics.umass.edu/advising>
- Disability Services: <https://www.umass.edu/disability/>
- English as a Second Language: <http://www.umass.edu/esl>
- Learning Resource Center: <https://www.umass.edu/lrc/>
- Student Success: <https://www.umass.edu/studentssuccess/>
- Title IX Resources: <https://www.umass.edu/titleix/title-ix-campus-resources>
- UMass Libraries: <https://www.library.umass.edu>
- Writing Center: <http://www.umass.edu/writingcenter>