SFWE 407 / 507: Foundations of Software Engineering
Course Syllabus
(3 units)

Course Description

This course will provide students with the foundational skills and knowledge used by software engineers in diverse industries. Students will understand what software engineering is and why it is more than *'just writing code'*. The course introduces students to the different software development lifecycle (SDLC) phases used in developing, delivering, and maintaining software products for a wide variety of applications. Common software process models will be introduced, along with developing an understanding of the importance of defining software requirements, developing software architectures and designs, and the various forms of testing that go into delivering reliable and resilient software systems. Additionally, the course will cover the basics of software reliability, safety, security, and quality that all software engineers should be familiar with throughout software development activities. Students will also learn and use tools to manage the configuration of various software artifacts that are created throughout the product development lifecycle. Common terminology used in the software engineering profession will be explored, utilized, and become part of the student's vocabulary by the end of the course.

Learning Format:

This course is designed to engage and demonstrate key concepts of the materials covered using collaborative learning strategies. You will watch pre-recorded lecture materials that may have interactive features integrated into the materials before coming to class. During each module, the class will break into small teams or discussion groups to work on activities that demonstrate the key principles covered in the lectures.

Course Objectives:

During this course, you will be able to:

1. List and describe the fundamental activities performed in each of the Software Development Lifecycle (SDLC) phases.
2. Define and describe fundamental software engineering terminology.
3. Explore/explain relationships between software engineering and other engineering disciplines (Systems Engineering, Electrical and Computer Engineering, Industrial Engineering).
4. Explore different software development process models that are commonly used in industry.
5. Study the importance of integrating software quality, safety and reliability into activities performed in the SDLC phases.

6. Utilize configuration control practices on various artifacts created throughout the software development lifecycle.
7. Summarize ethical practices used in developing software products.
8. Demonstrate their software engineering knowledge through a representative software development project that expands through each phase of the SDLC.

Expected Learning Outcomes:

Upon the completion of this course, you should be able to:

1) Describe basic software development and computing fundamentals that make up the Software Development Lifecycle. *[ABET Student Outcome 1 - SW Engineering Addendum]*

2) Explore relationships between software engineering and other engineering disciplines (i.e., Systems Engineering, Electrical and Computer Engineering, Industrial Engineering, and Computer Science) *[ABET Student Outcome 3 and Student Outcome 1 - SW Engineering Addendum]*

3) Experiment with and use typical software development and configuration management tools used in developing and/or analyzing a software product. *[ABET Student Outcome 6]*
4) Compare and contrast how diverse software applications produce solutions to meet specific objectives/needs in a variety of fields including, but not limited to public health, safety, global, cultural, social, environmental, and economic applications *[ABET Student Outcome 2]*

5) Demonstrate and communicate software engineering principles effectively through written reports and/or verbal presentations. *[ABET Student Outcome 3]*

6) Summarize both ethical and professional responsibilities of a software engineer. *[ABET Student Outcome 4]*

7) Build a foundation for success in Software Engineering. *[ABET Student Outcome 7]*

8) *Graduate students only* – Write a paper that compares and contrasts the different software process models frequently used in industry. This paper will detail
    a. characteristics of each process model,
    b. the pros and cons of using the different models, and
    c. how using a different process model than what other engineering teams may be using on a large multi-disciplined project can impact the interactions with other teams.

Course Prerequisites:

Undergraduate prerequisite: ECE 175 or CSC 110 (*or other similar programming course*)

Graduate prerequisite: Programming experience (in any language) is strongly recommended for graduate students.

Note: *This course is not required for students majoring in Software Engineering as an undergrad or if the student graduated with a degree in Software Engineering at the University of Arizona.*

Course Format and Teaching Methods:

This course is structured around weekly progress, broken into approximately 2-week modules. It will include a combination of lectures, and small group activities focused on experiential learning, in-class discussions, and web-based assessments. The expected weekly progress is outlined in the course schedule. At a minimum it is recommended that students keep up with coursework by following the outlined course schedule on D2L. Note the due dates for course deliverables are posted on D2L.

Makeup Policy for Students Who Register Late:

If you register / join this class after the course has started, it is your responsibility to reach out to the instructor to develop a makeup schedule for any missed lectures / assignments. In general, it is expected that by the end of the first three weeks of the course that all missed work will be completed, and all subsequent work is on track. It is also your responsibility to be aware of any course grading policies and/or expectations discussed within the first week of class that may affect your final grade.

Course Communications:

Announcements and important reminders will be regularly posted on D2L. Log in frequently to check for new announcements, reminders, and information related to the course.

You are encouraged to reach out to your instructor frequently throughout the semester via or schedule an in-person or Zoom meeting. Every attempt will be made to respond to any questions or concerns that you may have within 24 hours, if possible (often sooner).

Class Attendance / Participation Policy:

The UA's policy concerning Class Attendance, Participation, and Administrative Drops is available at: http://catalog.arizona.edu/policy/class-attendance-participation-and-administrative-drop

Participating in this course is vital to the learning process. As such, timely participation in online discussions and/or any team collaboration assignments is absolutely required. You are expected to attend/watch all lectures and access the course at least twice a week. At a minimum, it is recommended that you keep up with coursework by following the outlined course schedule and notifications that will be posted on D2L.

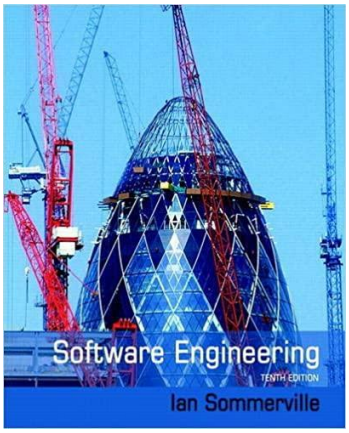
Absences or failure to participate in class may affect your final course grade. If you anticipate being absent, are unexpectedly absent, or are unable to participate in class activities, please contact the instructor as soon as possible. To request a disability-related accommodation to this attendance policy, please contact the Disability Resource Center at (520) 621-3268 or drc-info@email.arizona.edu. If you are experiencing unexpected barriers to your success in your courses, the Dean of Students Office is a central support resource for all students and may be helpful. The Dean of Students Office is in the Robert L. Nugent Building, room 100, or call 520-621-7057.

The UA policy regarding absences for any sincerely held religious belief, observance or practice will be accommodated where reasonable, http://policy.arizona.edu/human-resources/religious-accommodation-policy.

Absences pre-approved by the UA Dean of Students (or Dean Designee) will be honored. See: https://deanofstudents.arizona.edu/absences

Textbooks:
The required textbook used in this course is:

Somerville, Ian, Software Engineering, 10th Edition, Pearson Publishing, March 2015.



Other Supplemental Readings / References: *Additional supplemental materials will be referenced and provided to students via D2L.*

Course Schedule:
The following table provides an outline for the topics that will be covered during each module for this course. Specific dates for different assignments, discussion topics, exams and projects will be posted on D2L for any given semester.

Module	Topic	Assignments / Due Dates
Module 1	Introduction to the Software Engineering Lifecycle (SDLC)	*Posted on D2L*
Module 2	Software Process Models	*Posted on D2L*

Module 3	Software Requirements Engineering	*Posted on D2L*
Module 4	Software Modeling and Design	*Posted on D2L*
Module 5	Implementation and Software Testing	*Posted on D2L*
Module 6	Software Deployment and Configuration Management	*Posted on D2L*
Module 7	Software 'Ilities (Reliability, Safety, Security, and Software Quality Assurance)	*Posted on D2L*
Module 8	Software Reuse and Evolution	*Posted on D2L*

D2L Course Management System:

This course uses the University of Arizona's D2L course management system. You are **required** to use D2L with this class and are encouraged to check our D2L class course space daily.

You are also encouraged to have D2L email forwarded to your primary University of Arizona email account. We will use D2L for course assignments, exams, content distribution, and important announcements. The University of Arizona's D2L system is available at: http://D2L.arizona.edu.

Course Assignments and Exams:

There will be regular homework assignments on the topics covered in class, with approximately 8 homework assignments and one semester project. There will also be module-based discussion board prompts that each student is required to participate in and will be graded for. There will be one midterm exam and a comprehensive final exam. All exams will be given as an online, timed exam, administered by a proctor, that will be available during the regularly scheduled exam time. Note: the instructor will give students ample notice of the format, time, and any resulting stipulations about where and how the exams will be administered.

Final Examination:

The date and time of the final exam and project will be posted on D2L. You can find the date of the final exam at https://registrar.arizona.edu/faculty-staff-resources/room-class-scheduling/schedule-classes/final-exams.

Grading Scale and Policies:

The grading distribution for course assignments, class participation, semester project, and exams is as follows:

Homework Assignments:	*20%*
Course Participation:	*10%*
Midterm Exam (1):	*20%*

Comprehensive Final Exam (1):	*20%*
Semester Project (1):	*30%*

NOTE: As part of the semester project, graduate students will also be required to submit an additional paper that compares / contrasts the different software process models frequently used in industry. This paper will detail characteristics of each process model, the pros and cons of using the different models, and how using a different process model than what other engineering teams may be using on a large multi-disciplined project can impact the interactions with other teams.

Total	***100%***

The following scale will be used to award the final grades:

Percentage	Letter Grade
90% – 100%	**A**
80% – 89%	**B**
70% – 79%	**C**
60% – 69%	**D**
<60%	**E**

Homework is due at the time that it is specified in the course schedule and/or D2L content pages. ***Late homework and projects will not be accepted without prior approval by the instructor and will receive 0 points.***

Course Time Zone:

All dates and times mentioned in this course represent Mountain Standard Time (Arizona), which is UTC-7 hours. Arizona does not observe Daylight Savings Time. You can use the following link to get the current local time in Tucson, Arizona: http://www.timeanddate.com/worldclock/city.html?n=393

Course Policies:

Make-up exams: A make-up exam may only be given under extraordinary circumstances. The student requesting a make-up exam should contact the instructor well in advance and provide *written* documentation for the reason that he/she will not be able to attend the regularly scheduled exam. It is up to the discretion of the Instructor to accept the justification provided by the student.

Requests for incompletes (I) and withdrawal (W) must be made in accordance with University policies which are available at http://catalog.arizona.edu/2015-16/policies/grade.htm#I and http://catalog.arizona.edu/2015-16/policies/grade.htm#W respectively.

Dispute of Grade Policy:

You can dispute any grade that you receive within two weeks that the grade has been awarded.

Incomplete (I) or Withdrawal (W):

Requests for incomplete (I) or withdrawal (W) must be made in accordance with University policies, which are available at:

https://registrar.arizona.edu/faculty-staff-resources/grading/grading-policies/incomplete

https://registrar.arizona.edu/faculty-staff-resources/grading/grading-policies/withdrawals

Academic Policies and Institutional Resources:

Academic Policies and Procedures:

As a University of Arizona student, you are expected to become familiar with and abide by the university-wide policies and procedures. You can find complete, up-to-date information at: http://catalog.arizona.edu/policies

Use of Generative AI

In this course only, students may use generative artificial intelligence / large-language-model tools for non-graded learning, but never for Homework, Exams, or Projects. The student is responsible for citation and attribution, investigating and deciding the accuracy, credibility, and source of any information they gain from these tools.

Use of these tools on Homework, Exams, or Projects is considered a violation of the Code of Academic Integrity and subject to the most severe sanctions listed in the section below, Code of Academic Integrity.

Academic Integrity:

This course has a zero tolerance policy with respect to violations of academic integrity. Students are encouraged to share intellectual views and discuss freely the principles and applications of course materials. However, graded work/exercises must be the product of independent effort unless otherwise instructed. Students are expected to adhere to the UA Code of Academic Integrity as described in the UA General Catalog. See: http://deanofstudents.arizona.edu/academic-integrity/students/academic-integrity.

Academic Dishonesty occurs whenever any action or attempted action is pursued that creates an unfair academic advantage or disadvantage for student and/or any member or members of the academic community. All forms of academic dishonesty are subject to sanctions under the Code of Academic Integrity. Sanctions include written warning, reduction in grade for work involved, disciplinary probation, loss of credit for work involved, failing grade in the course, suspension, and/or expulsion. Various forms of academic dishonesty include, but are not limited to cheating, fabrication, facilitating academic dishonesty, and/or plagiarism. If you are unclear what constitutes plagiarism, please ask the instructor.

Academic Misconduct is defined as any behaviors not conforming to prevailing standards or rules within the academic community. All forms of academic misconduct are subject to sanctions under the Code of

Conduct. Sanctions include restricted access to University property, administrative hold, warning, probation, suspension, and/or expulsion. Various forms of academic misconduct include, but are not limited to disruptive behavior, threatening behavior, and/or the theft or damage of University property. For more specific examples of academic dishonesty, academic misconduct, and how to avoid such behaviors, please visit the following website: http://deanofstudents.arizona.edu/tipsforavoidingacademicdishonesty

The University Libraries have some excellent tips for avoiding plagiarism available at: http://www.library.arizona.edu/help/tutorials/plagiarism/index.html.

Selling class notes and/or other course materials to other students or to a third party for resale is not permitted without the instructor's express written consent. Violations to this and other course rules are subject to the Code of Academic Integrity and may result in course sanctions. Additionally, students who use D2L or UA email to sell or buy these copyrighted materials are subject to Code of Conduct Violations for misuse of student email addresses. This conduct may also constitute copyright infringement.

Classroom Behavior Policy:

To foster a positive learning environment, students and the instructor have a shared responsibility. We want a safe, welcoming, and inclusive environment where all of us feel comfortable with each other and where we can challenge ourselves to succeed. To that end, our focus is on the tasks at hand and not on extraneous activities (e.g., texting, chatting, reading a newspaper, making phone calls, web surfing, etc.).

Online Collaboration/Netiquette:

In this course, you will primarily communicate with the instructor and peers through a variety of tools such as discussion forums, email, Zoom, and other forms of web conferencing. The following guidelines will enable everyone enrolled in the course to participate and collaborate in a productive, safe environment.

- Be professional, courteous, and respectful as you would in a physical classroom.
- Online communication lacks nonverbal cues that provide much of the meaning and nuances in face-to-face conversations. Choose your words carefully, phrase your sentences clearly, and stay on topic.
- It is expected that students may disagree with the research presented or the opinions of their fellow classmates. To disagree is fine but to disparage others' views is unacceptable. All comments should be kept civil and thoughtful. Remember that this course abides by university policies regarding disruptive behavior: http://policy.arizona.edu/education-and-student-affairs/disruptive-behavior-instructional-setting
- Compose your messages and posts in a word processing tool and check your spelling and grammar before submitting your post / email.

Threatening Behavior Policy:

The UA Threatening Behavior by Students Policy prohibits threats of physical harm to any member of the University community, including to one's self. See: http://policy.arizona.edu/education-and-student-affairs/threatening-behavior-students.

UA Nondiscrimination and Anti-harassment Policy:

The University is committed to creating and maintaining an environment free of discrimination, http://policy.arizona.edu/human-resources/nondiscrimination-and-anti-harassment-policy

Our classroom is a place where everyone is encouraged to express well-formed opinions and their reasons for those opinions. We also want to create a tolerant and open environment where such opinions can be expressed without resorting to bullying or discrimination of others.

Statement of copyrighted materials:

All lecture notes, lectures, study guides and other course materials disseminated by the instructor to the students, whether in class or online, are original materials and reflect intellectual property of the instructor or author of those works (with the exception of other published reference materials – i.e. course textbooks). All readings, study guides, lecture notes and handouts are intended for individual use by students. You may not distribute or reproduce these materials for commercial purposes without the express written consent of the instructor. Students who sell or distribute these materials for any use other than their own are in violation of the University's Intellectual Property Policy (available at http://ogc.arizona.edu/node/16). Violations of the instructor's copyright may result in course sanctions and violate the Code of Academic Integrity.

Student Support:

The instructor is available to assist with **content-related** issues. You may, at any time, email the instructor. This course also provides an ***Ask the Instructor*** discussion forum within the D2L environment. You are encouraged to post content-related questions to this forum at any time, especially for things that will benefit all students. *(It is not recommended that you use this forum for individual questions that are specific to your work or performance in the class.)* This forum will be monitored on a regular basis and the instructor will respond in a timely fashion. It is common for other students to participate in answering questions posted in the ***Ask the Instructor*** forum. You should feel free to contribute to the solution if you can provide knowledge or guidance related to the question.

The following are guidelines for requesting support:

- **General Course Questions:** Use the ***Ask the Instructor*** discussion forum for questions regarding course materials or policy.
- **Personal Course Questions**: Email the instructor to discuss grades or personal concern.
- **D2L Support Questions**: Email D2L@email.arizona.edu

Accommodations for Students with Disabilities:

The goal for this class is to enable learning experiences that are as accessible as possible. If you anticipate or experience physical or academic barriers based on disability, please let the instructor know immediately so that we can discuss options. You are encouraged to contact Disability Resources (520-621-3268) to establish reasonable accommodations. For additional information on Disability Resources and reasonable accommodations, please visit http://drc.arizona.edu/.

If you have reasonable accommodations, please plan to meet with the instructor by appointment to discuss accommodations and how course requirements and activities may impact your ability to fully participate.

Students needing special accommodations or special services should contact the Disability Resources Center, 1224 East Lowell Street, Tucson AZ 85721, (520)621-3268, FAX (520)621-9423, email: drc-info@email.arizona.edu, http://drc.arizona.edu/. You must register and request that the center or DRC send the instructor official notification of your needs as soon as possible.

Please contact the instructor to discuss accommodations and how this course's requirements may impact your ability to fully participate. The need for accommodations must be documented by the Disability Resources Center.

Library Support:
The University of Arizona Libraries provides the research tools you need at any time. For an abbreviated list of resources directly related to a specific course, select the **Library Tools** link (located in the Tools drop down on the left of the screen within the Course Navigation bar).

Course Grievance Policy:
In case of grievances with a course component or grading, students are encouraged to first try and resolve the issue with the instructors. If you feel the issue is not resolved satisfactorily, please send an email to misonline@eller.arizona.edu.

Additional Resources for Students (recommended links):

- Student Assistance and Advocacy information is available at:
  - http://deanofstudents.arizona.edu/student-assistance/students/student-assistance
- **Confidentiality of Student Records:** http://www.registrar.arizona.edu/ferpa/default.htm

Subject to Change Statement:
Information contained in the course syllabus, other than the grade and absence policy, may be subject to change with advance notice, as deemed appropriate by the instructor.