

Spring 2024 Software Engineering (CS 321) Syllabus

Instructors

Section 004 (CRN 13016) :

Professor: Mike Reep, Ph.D.
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Office: ENG 4417
Office Hours: Tuesday and Thursday, 10:30 – 11:30 am or by appointment

GTA: TBA
UTA: TBA

Class: CS 321 004 – 9:00-10:15, T/H, Thompson Hall, Room 2021

Section 009 (CRN 23597):

Professor: Steven Ernst
E-mail: sernst2@gmu.edu
Office Hours: Following class session or by appointment

GTA: TBA
UTA: TBA

Class: CS 321 009 – 5:55-7:10, M/W, Innovation Hall, Room 136

Section 010 (CRN 23598):

Professor: Tariq Islam
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Office Hours: Following class session or by appointment

GTA: TBA
UTA: TBA

Class: CS 321 010 – 5:55-7:10, T/H, Horizon Hall, Room 1010

Overview

Prerequisites: Grade of C or better in CS 310 AND ENGH 302 or equivalent

Text

The text is required as there is much more fundamental knowledge about Software Engineering than we can cover in lectures. The text is available at no-charge through the GMU library for up to 100 simultaneous users.

- *Beginning Software Engineering, 2nd Edition*, Rod Stephens, Wiley, 2023

Catalog Description

An introduction to concepts, methods, and tools for the creation of large-scale software systems. Methods, tools, notations, and validation techniques to analyze, specify, prototype, and maintain software requirements. Introduction to object-oriented requirements modeling, including use of case modeling, static modeling, and dynamic modeling using the Unified Modeling Language (UML) notation. Concepts and methods for the design of large-scale software systems. Fundamental design concepts and design notations are introduced. A study of object-oriented analysis and design modeling using the UML notation. Students participate in a group project on software requirements, specification, and object-oriented software design.

Specialized Designation: Writing Intensive in Major

Course Objectives

Upon completion of the course, students should have:

1. An understanding of all phases of the software engineering lifecycle (requirements, design, implementation, testing, deployment, maintenance).
2. An understanding of several lifecycle models including both prescriptive and Agile methodologies and knowledge of tradeoffs among the methodologies.
3. An ability to document software requirements and design artifacts.
4. An ability to analytically evaluate software usability.
5. An understanding of fundamental techniques used to lead a software team.
6. An ability to apply software engineering techniques to create a minimum viable product.

Writing Assignments

CS 321 includes Writing Intensive (WI) activities that, together with those of CS 306 (Ethics course), meet the GMU WI Requirements in the BS CS Program (<http://wac.gmu.edu>). This means you will write 1750+ graded words (or about 7 standard pages).

WI Learning Outcomes: All Writing-intensive courses should integrate the following learning outcomes into their course designs:

- **Writing-to-Learn:** students will use informal or formal writing in ways that deepen their awareness of the field of study and its subject matter.
- **Writing-to-Communicate:** students will compose one or more written genres specific to the field of study in order to communicate key ideas tailored to specific audiences and purposes; genres may be academic, public, or professional.
- **Writing-as-a-Process:** students will draft and revise written works based on feedback they receive from instructors and peers, using strategies appropriate to the genre, audience, and purpose.

For the first writing assignment, you will pick a topic related to the learning modules and write a paper expanding on that topic including literature review (3 of which are from peer-reviewed publications/journals) and citations. This assignment addresses the Writing-as-a-Process outcome by following a multi-step process. The assignment also addresses Writing-to-Learn which will also be incorporated into class exercises.

The second writing assignment is integrated into the group project. You and your teammates will prepare documentation throughout the project. This documentation will then be peer-reviewed in addition to the grade-focused review. The documentation will be updated throughout the project to incorporate the feedback and deliver a final paper at the completion of the project. This assignment addresses the Writing-to-Communicate and Writing-as-a-Process outcome.

Class Approach

Class Format

The class focuses on implementing the weekly topics into the group project. In general, the material presented during one week is then incorporated into the project the following week(s). The material is introduced through readings and videos, knowledge checked through quizzes, and key points highlighted in the lectures with small group exercises supplementing the lecture when possible.

Course Website

Blackboard will be used for this course. You can access the site at <http://mymasonportal.gmu.edu>. Login and click on the "Courses" tab. You will see CS 321. NOTE: Username and passwords are the same as your Mason email account. You must have consistent access to an Internet connection in order to complete the assignments in this course through Blackboard (<http://mymason.gmu.edu>). The Blackboard site will be used by all three sections following this course structure.

Discussion Board

Piazza is used to maintain communications between classroom sessions and allow students the opportunity to interact with each other on the group project. An "Ask the Professor" is provided for any questions or topics that may be of interest to the entire class including the other sections. These types of inquiries are not accepted by email and must be posted on the Discussion Board for all to see. (Personal or sensitive topics are still handled via email.)

All electronic postings must be professional, respectful, positive and courteous. The [Core Rules of "Netiquette"](#) provide guidelines on how to carefully craft your communications in the online classroom to avoid misinterpretation.

Readings

Readings, as given on the schedule page, allow you to understand the concepts and the theory behind the applications. The readings provide insights, background and information in more detail and scope than we can cover in class but are critical for your success (academic and professional). The readings are needed to perform at an A level on the project, exams and quizzes. The lectures will not cover everything in the readings and will often include material not found in the readings.

In order to fully participate in class and score well on the associated quiz, the assigned readings need to be completed by the first class for that lesson.

Quizzes

We will have in-class quizzes starting the second week and these will usually be given in the first class for a lesson. The primary purpose of the quiz is to encourage students to complete the assigned readings and have a basic understanding of the material **prior** to the first class for each lesson. This approach enables us to focus on addressing questions and more complex topics plus some preparation for and doing in-class exercises based on the weekly topic. Therefore the quizzes will focus on the assigned readings for that lesson with an emphasis on the weekly learning objectives.

Quizzes are available on Blackboard in the first ten minutes of class. Quizzes are closed-book, closed notes, no access to other web sites, and no other assistance allowed. Quizzes submitted after the ten minute limit will be assessed a 10% late penalty unless an accommodation is already in place.

The quizzes consist of a combination of multiple-choice, true/false, and fill-in-the-blank to evaluate understanding of the terms and concepts. There are no-retakes or make-up quizzes but the lowest three scores are dropped.

Participation

Learning can only happen when you are playing an active role. It is important to place more emphasis on developing your insights and skills, rather than transmitting information. Knowledge is more important than facts and definitions. It is a way of looking at the world, an ability to interpret and organize future information. An active learning approach will more likely result in long-term retention and better understanding because you make the content of what you are learning concrete and real in your mind.

Although an active role can look differently for various individuals, it is expected in this class that you will work to explore issues and ideas under the guidance of the professor and your peers. You can do this by reflecting on the content and activities of this course, asking questions, striving for answers, interpreting observations, and discussing issues with your peers. A participation grade will be awarded based on attendance, class and discussion board interactions, and the successful completion of in-class exercises throughout the semester. The in-class exercise may be a short (2-3 question) quiz on the material covered in the class.

NOTE: Almost every class will allocate the last section of the time period to group meetings. Therefore regular attendance is even more critical to support your fellow group members in a successful project.

Group Project

CS 321 includes a software engineering project that requires students to participate in working teams where students organize, manage, and practice the software engineering lifecycle. The team project will cover software requirements, architecture, design, coding, and testing. Your final grade for this component will include peer evaluation grades provided by your teammates and your contributions to every assignment. Also, each team member will be assessed by the instructors.

Exams

The exams will cover the learning objectives listed for each lesson. The mid-term will address the first half of the semester and the final will focus on the second half of the semester (but may include key topics from earlier on). A laptop is required to complete the on-line exams during the assigned time periods. A study guide will be provided to facilitate preparation at least one week prior to the exam. The exam is closed book, notes, phone, tablet or any other type of assistance.

Course Grades

- Participation: 10%
- Quizzes: 10%
- Writing Assignments: 20%
- Group Project: 30%
- Mid-Term: 15%
- Final Exam: 15%

The following scale will be applied to compute final course letter grades:

A+ ($\geq 97.0\%$) A ($\geq 92.0\%$) A- ($\geq 90.0\%$)

B+ ($\geq 87.0\%$) B ($\geq 82.0\%$) B- ($\geq 80.0\%$)

C+ ($\geq 77.0\%$) C ($\geq 72.0\%$) C- ($\geq 70.0\%$)

D ($\geq 60.0\%$) F ($< 60.0\%$)

Submission Deadlines

All assignments are due by midnight on the assigned date unless otherwise noted on the schedule or assignment listing. Late submissions are subject to a 10% penalty for missing the deadline, are accepted after 48 hours with a 25% deduction and not accepted after one week without prior permission. Assignments will be submitted in Blackboard via the Assignment feature. You are expected to verify your own Blackboard responses by returning to the appropriate place in Blackboard after the work has been posted.

Grading

Most project and assignment grading will be completed by the Graduate Teaching Assistants (GTAs) based on the rubric provided with the assignment. If you disagree with the grades assessed, contact the GTA first with the basis of your request and the grade you believe should have been assigned. If you and the GTA are unable to come to a resolution, escalate the matter to your Professor along with the email thread for the GTA discussion.

Class Policies

E-mail

We will occasionally send important announcements to your Mason email account. If an instructor is running late for the class or has some other issue that will impact the class, we will make that announcement through Blackboard. Emails sent to instructors should start the subject line with “CS 321” and then include a topic.

Questions about the technical material, class policies, discussions or other topics of interest to the entire class **must** be posted on the associated Piazza discussion board or *Ask the Professor* discussion board and not sent by email. E-mails of this type will not be answered and redirected to Piazza.

Our goal is to answer emails and board postings within one business day. In accordance with GMU policy, all email communication will be sent only to your Mason email account.

Before sending an email, please check the following unless the email is of a personal nature:

1. Syllabus and Schedule
2. *Ask the Professor* discussion board
3. On-demand Blackboard videos on how to use Blackboard features, and Technical Requirements.

Feel free to respond to other students in the *Ask the Professor* forum if you know the answer.

Schedule

Every attempt is made to adhere to the posted Blackboard schedule. All schedule updates will be announced on Blackboard. Changes are made to facilitate learning, provide opportunities to thoroughly address topics within the class or address unforeseen circumstances. Changes are announced via Blackboard and the revised schedule is posted on the Blackboard site.

Recordings

We may record classes for the use of students who can make an individual session or for review afterwards. These are not a substitute for attending in-person classes, are not guaranteed to be available, are not edited and may have issues such as audio, readability of the slides and boards, or focus. These videos will only be posted to Blackboard.

All course materials posted to Blackboard or other course site are private to this class; by federal law, any materials that identify specific students (via their name, voice, or image) must not be shared with anyone not enrolled in this class.

Video recordings -- whether made by instructors or students -- of class meetings that include audio, visual, or textual information from other students are private and must not be shared outside the class.

Live video conference meetings (e.g. Collaborate or Zoom) that include audio, textual, or visual information from other students must be viewed privately and not shared with others in your household or recorded and shared outside the class.

Technology

You will need a reliable computer with sufficient capabilities for tasks such as compiling and running web servers, functional camera and microphone, and Internet access to view course materials in Blackboard, take the quizzes and exams, complete the coding for the group project, and record assignments for the group project which captures the screen and voice.

In-Class Computer Use

Computers will be used extensively during in-class exercises, quizzes, discussions, and examples. Outside note taking and referring to class slides, their use during lectures should be minimized as a courtesy to your fellow students. Complaint(s) about specific students using computers inappropriately will result in the loss of their use during lectures.

AI Use

ChatGPT or other Generative-AI models may not be used in this course as an assistant in the project, research paper, or other assignments unless otherwise specifically stated by the instructors.

In terms of learning in this class and the associated software development processes, students who replace their own learning and project work with materials prepared by Generative-AI models:

- Sacrifice the opportunity to acquire the knowledge, skills, and critical thinking taught in the course.
- Risk being unable to perform to expectations in the academic environment when Generative-AI models are unavailable, such as in exams
- Ultimately endanger their employability if they are unable to produce work other than that produced by Generative-AI models

Social Media

We accept LinkedIn requests from current and former students – please be sure to include the class and year in the request. In general, we do not accept other social media requests on my personal accounts from school or work.

University-Based Policies and Support

Office of Disabilities

If you need academic accommodations, please see your instructor and contact the Disability Resource Center (DRC) at 703-993-2474. All academic accommodations must be arranged through the DRC and you must inform us, in writing, at the beginning of the semester. All academic accommodations must be arranged through that office. Please note that accommodations **MUST BE MADE BEFORE** assignments or exams are due. We cannot adjust your grade after the fact.

GMU Support Services

If you are need of assistance outside the classroom, many services are provided by Student Support and Advocacy Services (SSAC) including Patriot Pantry, personal crisis, survivor support, financial well-being, substances abuse and more at <https://ssac.gmu.edu/>

Counseling and Psychological Services (CAPS) partners with the Student Support and Advocacy Center to provide in-person and virtual, free and confidential, mental health services for enrolled students <https://caps.gmu.edu/> .

GMU Writing Center

Take advantage of the Writing Center space (<https://writingcenter.gmu.edu/>) and peer consultants as you work on written assignments in this course. You can book a free 45-minute appointment to meet with a consultant in person or on Zoom or to submit a draft for written feedback. Consultants will work with you on any phase of a writing project. They can help you develop your ideas, provide feedback on a draft, answer your questions, and show you strategies for brainstorming, organizing, drafting, revising, and editing. Schedule your appointment to allow plenty of time for revising your paper afterwards. To make an appointment, go to writingcenter.gmu.edu, register with the center, and make an appointment using the online scheduler. Watch this short video (<https://youtu.be/LA-B0Szoe28>) for more detailed guidance on making an appointment, and send any questions wcenter@gmu.edu .

Religious Holidays

If you need accommodations for a religious holiday, it is your responsibility to let us know the dates of major religious holidays on which you will be absent or unavailable due to religious observances within the first two weeks of the semester. The university calendar is available at <https://ulife.gmu.edu/religious-holiday-calendar/> for your reference.

Honor Code Statement

As with all GMU courses, CS is governed by the GMU Honor Code <https://oai.gmu.edu/full-honor-code-document/> and the CS Department Honor Code <https://cs.gmu.edu/resources/honor-code/> (which provides technical guidance). In this course, all quizzes and exams carry with them an implicit statement that it is the sole work of the author. On the writing assignment, peer reviews are permitted but the content must be your own. When joint work is authorized, including on the group project, all contributing students must be listed on the both the submission and individual sections of the assignment but must not include students who did not

participate. Guidance on the group project coding will be provided in the project description and must be adhered to in order to avoid violations. Any deviation from the above guidance is considered an Honor Code violation, and as a minimum, will result in failure of the submission and as a maximum, failure of the class.

Weekly Topics

The planned course topics are found below. The specific reading and course assignments will be posted on the Blackboard schedule.

- Lesson 1: Introduction to Software Engineering
- Lesson 2: Agile Overview
- Lesson 3: Requirements
- Lesson 4: Architecture
- Lesson 5: Design
- Lesson 6: User Experience/Configuration Management
- Lesson 7: Test Driven Development/Extreme Programming
- Spring Break
- Lesson 8: Mid-Term plus Construction/Scrum
- Lesson 9: Project Management/On-going Activities
- Lesson 10: Testing
- Lesson 11: DevOps/Pipelines
- Lesson 12: Lean/Maintenance
- Lesson 13: Reliable Programming and Security/Secure Lifecycles
- Lesson 14: Enterprise Agile and Ethics

Weekly Schedule

All schedule updates will be announced on Blackboard. Specific sections to read within the text chapters will be listed in the Lesson Introduction. Additional required readings will also be in the Lesson along with Supplemental materials to enhance your education.

Lesson	Topics	Textbook Reading	Project Assignments	Writing Assignments
Lesson 1 1/16	Introduction to Software Engineering	Introduction plus Chapter 1, 17 and 18 sections	<ul style="list-style-type: none"> Group Registration 	Topic Title and Research Question - Due 1/26
Lesson 2 1/23	Agile Overview	Chapter 3 and 19 plus Lesson Readings		
Lesson 3 1/30	Requirements	Chapter 5 plus Lesson Readings	<ul style="list-style-type: none"> Begin Iteration 1: Inception 	
Lesson 4 2/6	Architecture	Chapter 6 plus Lesson Readings		Pre-Writing - Due 2/9
Lesson 5 2/13	Design	Chapter 7 plus Lesson Readings	<ul style="list-style-type: none"> Iteration 1 Deliverables Due (2/16) Begin Iteration 2: Architecture / Design 	
Lesson 6 2/20	Configuration Management /Git	Chapter 9 plus Lesson Readings		First Draft- Due 2/23

Lesson 7 2/27	Test Driven Development/ Extreme Programming	Chapter 19 plus Lesson Readings	<ul style="list-style-type: none"> • Iteration 2 Deliverables Due (3/1) • Perform Peer- Reviews (by 3/11) • Begin Iteration 3: GitHub and Unit Tests 	Partner Peer Review - Due 3/1
3/5	Spring Break			
Lesson 8 3/12	Mid-Term Construction/Scrum	Chapter 10 and 19 plus Lesson Readings		Second Draft - Due 3/15
Lesson 9 3/19	Project Management/ On-Going Activities	Chapter 2, 4 and 15 plus Lesson Readings	<ul style="list-style-type: none"> • Iteration 3 Deliverables Due (3/22) • Begin Iteration 4: Sprint 1 (Core capabilities) 	Class Peer Reviews - Due 3/22
Lesson 10 3/26	Testing	Chapter 13 plus Lesson Readings		Final Draft - Due 3/29
Lesson 11 4/2	DevOps/Pipelines	Chapter 14 plus Lesson Readings	<ul style="list-style-type: none"> • Iteration 4 Deliverables Due (4/5) • Begin Iteration 5: Sprint 2 (More functionality, branching, automation) 	Instructor Reviews - Due 4/5

Lesson 12 4/9	Maintenance/Lean	Chapter 16 and 19 plus Lesson Readings		Final Paper - Due 4/12
Lesson 13 4/16	Reliable Programming and Security/Secure Lifecycles	Chapter 8 plus Lesson Readings		Presentations Begin
Lesson 14 4/23	Enterprise Agile and Ethics	Chapter 20 plus Lesson Readings	<ul style="list-style-type: none"> • Iteration 5 Deliverables Due (4/26): • Project Deliverables and Recorded Presentations 	Presentations End
Finals	Final Exam <ul style="list-style-type: none"> • Reading Days: Tue, 4/30 • 004: Thur, 5/2, 10:30-1:15 • 009: Mon, 5/6, 4:30-7:15 • 010: Thur. 5/2, 4:30-7:15 			