CS 490: Design in Software Engineering

Syllabus

Instructor

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Classroom Assistant

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Course Description

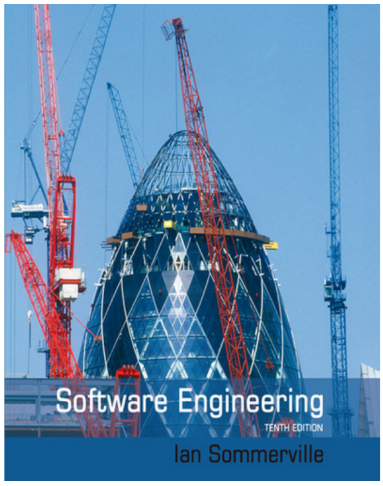
This course focuses on the methodology for developing software systems. You have learned how to program in earlier classes and have written numerous small projects in your academic career. This course will focus on designing and developing end-to-end software project using modern technology and tools. You will learn software engineering processes, Agile software development, Requirements engineering, system modeling, architectural design, software design and implementation, software testing, and deployments.

Course Outcomes

- Understand the principles and practices of software design.
- Analyze requirements and create software architecture.
- Design components and modules, using design patterns and heuristics.
- Evaluate design alternatives based on software metrics.
- Apply design principles to real-world software engineering problems.
- You will have worked in a team of developers to create a production grade application. You may add to your portfolio to showcase future employers.
- You will know the software engineering process from design, implementation to testing and deploying software in production like environment.
- You will have learned advanced topics such as software systems dependability, reliability, safety, security.
- You will have learned of CI/CD, performance testing, integration testing, UI testing

Textbook

Textbook is **NOT** required for this course, but a textbook is used to teach the material. There is no reason to buy the book unless you plan on reading the entire book for self improvement. Each chapter of the book has a power point presentation, and it will be uploaded on canvas.



Software Engineering (10th Edition)
Ian Sommerville
ISBN: 978-0133943030

Note: 9th edition of this book can be used as a substitute.

Topics

- What is Software Engineering?
- Version control
- Software Engineering process
- Project Management/Development team
- Agile Software Development
- Requirements engineering
- System Modeling
- Architectural Design
- Software Design & Implementation
- Software Testing
- Software Dependability
- Software reliability, safety, security

Grades calculation

Participation & Professionalism	10%	
Individual Projects	20%	Multiple Milestones
Group Project	45%	Multiple Milestones
Midterm	10%	30 minutes – Multiple Choice
Final Exam	15%	30 minutes – Multiple Choice

Letter Grade Cutoffs

Letter	A	B+	B	C+	C	D
Cutoff	90	85	80	75	70	60

Individual Project Deliverables:

This is just a high-level overview of each deliverable. Refer to the Individual Project document for additional details on deliverables for each milestone.

- Milestone 1 – 7%
    - Sakila DB Query worksheet
    - Technology decision documentation.
- Milestone 2 – 5%
    - 60-70% of the features should be implemented with minor bugs
- Milestone 3 – 8%
    - All features should be implemented and working as intended
    - Application should be deployed to any platform of your choice.
    - A working Video demonstration of your application. You may use Kaltura (provided by NJIT) and share the link. Alternatively, you may use any software of your choice to record a video and upload it to YouTube as a private upload and share its link.

Final Group Project Deliverables:

This is just a high-level overview of deliverables for group project. Refer to group project documentation for additional details on what each milestone should include.

- Planning Documents:
    - Tech Stack Analysis – Why you picked your technology over competing products or framework.
    - Database – ER Diagram, SQL Scripts (create tables/utility scripts/load mock data/etc.)
    - Business - User story documents
- Application Codebase
    - Front end
    - Back end
- Unit Tests – 70% Coverage
- Integration Tests – at least 3 happy path scenarios and 3 unhappy paths
- Automated UI tests – 70% of use cases
- At least 1 CI/CD pipeline for deployment
- Test result report – Manual metrics is also accepted.
- Individual Contribution summary
- Individual reflection paper
- Presentation Slides for Midpoint and Final presentation
- Live demonstration of application during Midpoint and Final Presentation

Course Schedule:

Lecture	Date	Topic	Milestones
1	9/7	Introduction to Software Engineering Version Control – Git	Individual Project assigned
2	9/14	Software Engineering Process	IP Part 1 due
3	9/21	Agile Software Development Project Management/Development team	Form team for Group Project
4	9/28	Requirements engineering User story templates	IP Part 2 due
5	10/5	System Modeling	IP Final version due
6	10/12	Midterm Architectural Design	
7	10/19	Software Design & Implementation	Group Project – Milestone 1
8	10/26	Software Testing	
9	11/2	Group Presentation Midpoint	Group Project – Milestone 2 Group Presentation Midpoint
10	11/9	Dependable Systems	
11	11/16	Reliability Engineering **	Group Project – Milestone 3
12	11/21	Safety Engineering **	
13	11/30	Security Engineering ** Final Exam	Final Exam
14	12/7	Final Group Presentation	Final Group Presentation

** Indicates that these are optional topics. They might not be covered due to previously scheduled lectures might take more than expected time to cover, or if I decide another more important topic should be covered in replacement of these topics.

Cheating Policy

Cheating on a programming assignment results in zero credit for all students involved. Cheating on an exam will result in an "F" in the course.

You may discuss problems with each other, in fact, you are encouraged to do so. Where does discussion end and cheating start? You may **NOT** copy lines of code from anybody or anywhere. You may **NOT** use code in your assignments that you did not write. You may not use third party frameworks without getting approval for it prior to starting project work. As a general rule: If you don't understand the code and can't explain the code, you can't use the code.

Please familiarize yourself with the NJIT Honor Code. Violations of the honor code will be dealt with seriously and reported immediately to the Dean of Students.

Note:

This is a tentative syllabus and is subject to change at the discretion of the instructor.

Canvas will be used to turn in all the assignments. You will have clear instructions and templates for turning in the assignments. Discord will be used for collaboration, and it is mandatory that everyone installs it on their phone and workstation. You will be given a private link to join discord 1 week prior to beginning of semester. In real world setting you will have Microsoft Teams, slack, Zoom, or some other

collaboration technology in your organization. We will be leveraging discord because it is free, and it is a great collaboration tool that provides voice channels, text channels, and ability to share screens.