ECE 452 Software Engineering

COURSE INSTRUCTOR AND CONTACT INFORMATION

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COURSE TEACHING ASSISTANT AND CONTACT INFORMATION

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- **Name**: Fangru Linghu
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- **Office**: EE building (will request a room & announce)

COURSE MEETING DAYS, TIMES, LOCATION, MODALITY

Course time: 8:30 AM – 9:50 AM, Monday/Thursday
Course location: EN-B120
Canvas sites: https://rutgers.instructure.com/courses/385187
Course format: In-person class. See attendance and participation for more policies.

OFFICE HOURS / STUDENT SUPPORT HOURS

Professor Office hours: 1-2PM Wednesday, or by appointment via email.

- CoRE 506, Busch campus

Teaching Assistant Office hours:

- Haoshen Yang:
  - Time: 10-11AM Friday
  - Location: In person: EE-230
- Fangru Linghu:
  - Time: 4-5PM Thursday
  - Location: In person: EE-226

COURSE DESCRIPTION

The Software Engineering course is essential for computer and electrical engineering students. It provides a comprehensive introduction to JavaScript programming, software

architecture, database systems and software testing. The course is project-oriented, focusing on hands-on experience and the practical application of these concepts. By the end of the course, students will be equipped to develop a fully functioning web application.

LEARNING GOALS

This course provides a comprehensive overview of fundamental software engineering concepts

- **Agile Development**: Understanding and practice of agile software development.
- **Requirement and User Story**: Understanding and defining the functional requirements of software systems.
- **Test Driven Design:** writing code that involves writing an automated unit-level test case that fails, then writing just enough code to make the test pass, then refactoring both the test code and the production code, then repeating with another new test case.
- **Software Architecture:** Emphasis on RESTful services and microservices architecture, which are essential for building scalable and maintainable applications.

Students are expected to have a solid understanding of JavaScript basics, as this course will not cover introductory JavaScript topics.

ASSESSMENT / GRADING COMPONENTS

Weighting of Assessments

Homework 20%

We will have up to two separate homework during this course. The homework will be posted and submitted through CANVAS. Please start your homework early to avoid delays in submission.

This is a *software engineering* course, so program code quality is critical. It is critical that the code gives a correct solution, but it is also critical that it is well designed. Design includes proper formatting for readability; favoring shorter code that provides equivalent functionality; favoring code that addresses boundary cases; favoring extensively tested code; favoring code that is easier to understand and extend; etc.2 All of these aspects will be considered in grading the homework assignments.

Homework generally requires JavaScript code with test cases. Some homework solutions require a narrative explaining the result you will observe when running your code.

Homework submission format — **only PDF or plain text** are acceptable. When submitting program code, if multiple code files are submitted then include everything in a **ZIP folder**. Your programming solutions must include test cases that are carefully selected with a good reason that is explained, instead of being purely randomly selected. Note that student programs may be tested with other cases in addition to those provided by the student.

It is acceptable to collaborate on solving a problem, but it is not acceptable to copy each other's solutions. In case homework solutions from different students raise suspicion of copying, the corresponding students will be notified that we suspect copying. For the first offense, each involved student will receive at most 40% of the maximum grade assigned to that homework. For the subsequent offenses, each student will receive zero credit and may be subject to administrative measures.

Course Project: 75%
The project report will be separated into multiple submissions. Overall, the requirements for the project are:

- The students are expected to build a web interface for agentic systems
- Develop the server and client-side (focus on the server!) preferably using only JavaScript, HTML, CSS, and Python
- The projects will consist of "modules" that are the same for all teams
- Each module will cover one or more past lectures and follow the guidelines about the goal and the technologies to be used

Class Participation: 5%
The project demo will be presented in class.

Late submission policy: All assignments are due on Canvas by class 11:59 PM Monday/Thursday. Each delayed day of the submission will introduce a 20 %-point penalty. That said, after 5 days of delays, there is no need for submissions.

TENTATIVE SCHEDULE OF TOPICS

Week	Time	Subject	Section	Note
1	Jan 22	Syllabus & Introduction		
2	Jan 26			
	Jan 29	Introduction		
3	Feb 2	JavaScript Functions and Objects TA coding mentoring session: Demonstrate how to install & use NodeJS and Jasmine JS Backend Development TA: Haoshen Yang		Assignment 1 Open
	Feb 5	Large Language Models and Agents		
4	Feb 9	TA session: vLLM installation TA: Fangru Linghu		Assignment 1 Due Assignment 2 Open
	Feb 12	Requirements Engineering TA session: cucumber.js		Grouping Done

Week	Time	Subject	Section	Note
		TA: Haoshen Yang		
5	Feb 16	In-class Discussion: Use Cases		Assignment 2 Due
	Feb 19	SaaS		
6	Feb 23	Cancelled		
	Feb 26	In-class Discussion: User Interface		Phase 1 Starts
7	Mar 2	Test Driven Design		
	Mar 5	TA session: Git/GitHub TA:		
8	Mar 9	Teams		
	Mar 12	Database-SQL/Domain Model		
9	Mar 16, 19	Spring Recess		Phase 1 Ends/ Phase 2 Starts
10	Mar 23	Legacy		
	Mar 26	LLM -- Inference		
11	Mar 30	Midterm Presentation		
	Apr 2	Midterm Presentation		
12	Apr 6	CoT and Tool Calling		
	Apr 9	Cancelled		Phase 2 Ends/ Phase 3 Starts
13	Apr 13	Guest Lecture ???		
	Apr 16	Guest Lecture: Continuous Integration/Continuous Deployment		
14	Apr 20	Design Patterns		
	Apr 23	DevOps		
15	Apr 27	**Final Presentation**		
	Apr 30	**Final Presentation**		
16	May 4	**Final Presentation**		Phase 3 Ends

POLICIES

Attendance and Participation

Per GRADING COMPONENTS, attendance and participation will be 10% of your total grade. While we encourage our students to attend the class and or participate in the discussion, the

student should not risk his/her health to fulfill this goal. More information about attendance and participation can be found https://sasundergrad.rutgers.edu/degree-requirements/policies/attendance-and-cancellation-of-classes.

Disability Accommodations

In order to receive consideration for reasonable accommodations, a student with a disability must contact the appropriate disability services office at the campus where you are officially enrolled, participate in an intake interview, and provide documentation." Please see https://ods.rutgers.edu/ or reach out to the instructor for more information.

CIVILITY / COMMUNICATION / CLASSROOM COMMUNITY / SENSITIVE TOPICS

This course is purely based on presentation and discussion. So, **the instructor would like to encourage a respectful communication and a supportive classroom community that celebrates diversity.** For the presentation, we want the presenters and participants to be aware of sensitive and uncomfortable topics, language, or images.

ACADEMIC INTEGRITY POLICY

Rutgers University takes academic dishonesty very seriously. By enrolling in this course, you assume responsibility for familiarizing yourself with the Academic Integrity Policy and the possible penalties (including suspension and expulsion) for violating the policy. As per the policy, all suspected violations will be reported to the Office of Student Conduct. Academic dishonesty includes (but is not limited to):

- Cheating
- Plagiarism
- Aiding others in committing a violation or allowing others to use your work
- Failure to cite sources correctly
- Fabrication
- Using another person's ideas or words without attribution, including re-using a previous assignment Unauthorized collaboration
- Sabotaging another student's work

If you are ever in doubt, consult your instructor.

If you have any questions, please visit the Rutgers University website on Academic Integrity: http://nbacademicintegrity.rutgers.edu/

STUDENT SUPPORT AND MENTAL WELLNESS

Rutgers University provides the following resources to support students in their academic success and mental wellness.

- Student Success Essentials: https://success.rutgers.edu
- Student Support Services: https://www.rutgers.edu/academics/student-support
- The Learning Centers: https://rlc.rutgers.edu/

- Rutgers Libraries: https://www.libraries.rutgers.edu/
- Bias Incident Reporting: https://studentaffairs.rutgers.edu/bias-incident-reporting
- Office of Veteran and Military Programs and Services: https://veterans.rutgers.edu
- Student Health Services: http://health.rutgers.edu/
- Counseling, Alcohol and Other Drug Assistance Program & Psychiatric Services (CAPS): http://health.rutgers.edu/medical-counseling-services/counseling/
- Office for Violence Prevention and Victim Assistance: www.vpva.rutgers.edu/