

CS 490: Design In Software Engineering

Delivered Online Via Zoom

Instructor: Sresht Rengesh (pronounced SRAY-sht)

New Jersey Institute of Technology, Fall 2020

Changelog:

Any changes made to the syllabus will be enumerated here.

- 09/17: Modify topics for Lessons 5-7.
- 09/08: Add Office Hours for TAs.
- 09/08: Remove Broadcast - all classes are now Live on Zoom.
- 09/01: Change Broadcast/Live schedules.
- 08/28: Update Wednesday Office Hours.

1 Names, Times, and Dates

1.1 Time & Hyperlink

All lectures will take place at <https://web.zoom.us/j/6508627641> (password cs490).

Section 001: Tues 12:30pm-1:50pm, Wed 11am-12:20pm

Section 003: Tues 11:00am-12:20pm, Wed 2:30pm-3:50pm

Section 005: Wed 9am-10:20am, Fri 12:30pm-1:50pm

1.2 Instructor and TAs

Instructor: Sresht Rengesh (he/him)

Email: sr66@njit.edu

Virtual Office Hours: Tues 2pm - 4pm, Wed 1:30pm - 2:20pm, Friday 10am - 12:20pm

By Appointment: Please email me to set up time outside of scheduled office hours if you cannot make the above times.

Note: Some weeks I will need to reschedule my office hours due to conflicts. I will always make up missed office hours, and I will let you know at least a week in advance when I must reschedule them.

Teaching Assistants:

- George Abou-Diwan (gma8@njit.edu)
 - Monday 11am-12:30pm, Thursday 11am-12:30pm
 - Link: <https://us02web.zoom.us/j/86494779728>
 - Password: cs490
- Kristianna Gaw (kg386@njit.edu)
 - Monday 2pm-4pm
 - Link: <https://us02web.zoom.us/j/83694822114>
 - Password: cs490
- Sean Weiss (sw465@njit.edu)
 - Thursday 1pm-2:30pm, Friday 2pm-3:30pm
 - Link: <https://us02web.zoom.us/j/4900014901>
 - Password: cs490

2 Course Information

2.1 Prerequisites

- CS 280: Programming Language Concepts
- CS 288: Intensive Programming in Linux

2.2 Textbook

There are no required textbooks for this course. The resources that will be essential to success in this course will all be online because online documentation will provide the best collection of resources for best practices, styling, and sample code. Below is a list of technologies we will use along with tutorials to get set up on all of them.

Technology	URL
AWS Cloud9	https://aws.amazon.com/cloud9/
Flask	https://flask.palletsprojects.com/en/1.1.x/
Bash	https://dev.to/awwsmm/101-bash-commands-and-tips-for-beginners-to-experts-30je
Vim	https://opensource.com/article/19/3/getting-started-vim
HTML	https://www.w3schools.com/html/
Git/GitHub	https://git-scm.com/docs/gittutorial
JSON	https://www.w3schools.com/js/js_json_intro.asp
Heroku	https://devcenter.heroku.com/articles/getting-started-with-python
Javascript	https://www.w3schools.com/js/
React.js	https://reactjs.org/tutorial/tutorial.html
Socket.io	https://socket.io/get-started/chat/
Kanban	https://www.atlassian.com/agile/kanban

2.3 EIR Program

This semester, NJIT is excited to partner with Facebook to bring an Engineer in Residence to teach CS490. For any specific questions or concerns related to required course accommodations, please reach out to Professor Baruch Schieber as your university point of contact. I will be your point of contact for all other questions and concerns (such as course content, assignments, assessments, grades, etc).

2.4 Rationale

The topics we will cover in this course are ones that will contribute to your success in the workplace and industry. During the course of the semester, we will work on projects that will provide you with the opportunity to work with groups of people you have never worked with, on projects you are new to, and using frameworks that you have not used. These projects will evolve in complexity as the semester goes on, and you will learn to tackle challenges (both technical and non-technical) using techniques that successful engineers use.

2.5 Course Goals

Upon successful completion of this course, you will be able to:

- Collaborate and effectively communicate with engineers you have never worked with before.
- Organize daily and weekly scrums to accomplish a shared vision with large moving components.
- Enumerate, analyze, and evaluate the implementation of various possible solutions to an issue.
- Design an elegant solution to a real-life problem, including technical specs.
- Employ various tools and technologies that (as of the time of writing this syllabus) are relevant to industry.

2.6 Course Non-Goals

This course **will not** prepare you to:

- Learn how to code.
- Become an expert on how specific technologies, libraries, or frameworks work under the hood.
- Master algorithms-style interview questions.

2.7 Course Applications

In this course, you will not only learn to apply modern technologies and use them to create new applications, you will learn how to onboard effectively onto new stacks so you can easily learn new skills (technical or otherwise) throughout your professional career. Working in technology means constantly adapting and applying existing skills to new and exciting problems outside your existing scope. The techniques and thinking patterns from this class will be integral towards that expectation.

3 Course Philosophy

Everyone in this classroom has the capacity for greatness, whether greatness means finishing your degree, landing an incredible job, building technology that changes the world, all of the above, or something completely different. For all of us to ensure that we can achieve these things, we embrace certain critical philosophies in this class.

3.1 Inclusivity and Equality

It is my responsibility, as well as yours, to ensure that every voice in the classroom is given equal priority and respect. Furthermore, nobody should feel uncomfortable asking a question or correcting a misunderstanding.

Discrimination on any grounds or for any reason will not be tolerated, and will be penalized per university guidelines. My primary goal this semester will be to create a learning environment where everybody feels comfortable and confident in both supporting others (including me) and receiving help.

3.2 Respect

I do not demand your respect, but I hope to earn it. Your peers should also have your respect, as well as yourself. In this class, we treat each other with the highest regard, and allow everyone in this class to have an equal voice and opportunity to learn. This also means showing up on time and ready to learn, out of respect for yourself and your peers who are trying to get the most out of their education.

3.3 Feedback

Learning to give and receive constructive, critical feedback is a very important part of an engineering career, especially in the context of collaboration. To practice the skill of receiving and providing actionable feedback, certain projects and homework assignments may require a non-anonymous peer review. These reviews will be graded on whether the feedback is high quality, constructive, and actionable.

If I am doing something wrong or if a particular method of teaching is not working, then I request that you share this with me in any way that you feel comfortable, anonymously or otherwise.

On this note, every class should be demonstrably valuable. If you feel like you don't understand why a concept is important in either an academic or industrial, then please let me know and I will guide you in hopefully understanding it.

3.4 Making Mistakes

CS490 will be one of the most rigorous and challenging classes in the NJIT Computer Science curriculum. Therefore, I do not expect anybody to master 100% of the content in this course on their first attempt. Misunderstandings are not only expected but healthy. In this classroom, I hope to create an environment where people feel comfortable pushing their limitations and challenging their capabilities. Part of this involves ensuring that people feel empowered to make mistakes and feel supported when they do, both by me and by other classmates.

4 Course Structure

4.1 Class Format

All classes will be conducted online synchronously, and your participation and attendance is required (unless you have an excused absence). There will be no in-person meetings. For an easier way to tune into lectures, just go to <https://00x.cs490lecture.com> (where x is your section number) and it will automatically redirect you to the right Zoom link!

4.2 Disability Accommodation

If you need accommodations due to a disability please contact the Office of Accessibility Resources and Services, KUPF 201, to discuss your specific needs. A Letter of Accommodation Eligibility from the Disability Support Services office authorizing your accommodations may be required.

5 Course Tools

5.1 Development Environments

AWS Cloud9: Cloud9 is a free Amazon offering that allows users to use an IDE on the Cloud. It's fully functional and makes it extremely easy to build and debug web programs. Cloud9 is platform-agnostic and works in-browser, and will be required for multiple exercises and assignments in class.

Repl.it: repl.it is a online code editor/compiler/terminal that supports several programming languages. I may use repl.it for in-class coding examples. Repl.it requires no setup, can be used from anywhere, and is easy to debug in.

5.2 Communication

Slack: <https://slack.cs490lecture.com>. Our day-to-day communication will be hosted on Slack, which is an online communication and collaboration platform. You will be required to sign up for Slack during your first week of class. Communication regarding projects, homework, or lectures should take place in designated group chats on Slack.

Canvas: <https://canvas.njit.edu>. Grades, feedback, and links for this course will primarily be through the NJIT learning management system, Canvas. That being said, I will not be monitoring Canvas to see if questions or discussions are posted there.

Email: For less real-time or more formal communication, you are also welcome to email me or any of your TAs. Please include the course name in the subject line and your name in the body of the message. Otherwise, it is highly likely that my spam filter will automatically filter your message.

6 Academic Integrity

Academic Integrity is the cornerstone of higher education and is central to the ideals of this course and the university. Cheating is strictly prohibited and devalues the degree that you are working on. Those who know me as an instructor are aware that I take cheating and academic plagiarism **extremely** seriously, and I have little leniency when it comes to academic dishonesty. As a member of the NJIT community, it is your responsibility to protect your educational investment by knowing and following the academic code of integrity policy that is found at:

<http://www.njit.edu/policies/sites/policies/files/academic-integrity-code.pdf>

Please note that it is my professional obligation and responsibility to report any academic misconduct to the Dean of Students Office. Any student found in violation of the code by cheating, plagiarizing or using any online software inappropriately will result in disciplinary action. This may include a failing grade of F, and/or suspension or dismissal from the university. If you have any questions about the code of Academic Integrity, please contact the Dean of Students Office at dos@njit.edu.

6.1 My Standard

I know many students find it difficult to define the line between academic dishonesty and getting help. As such, I will hold you to the following standard: **submitting code as your own work that you cannot explain or reproduce in a controlled environment is academic dishonesty**. Here are some concrete guidelines to help.

- Discussing the problems ("what does this mean?") and discussing solution approaches in general terms ("try using a Subscription model") are ok.
- Looking up syntax online is also okay as long as you have written the code yourself first.
- Posting on Slack or StackOverflow for feedback is okay as long as you are not sharing code that reveals answers to other students.
- Posting or copying answers to any assignments or assessments (for example, on Chegg or Canvas) is never okay. This will automatically result in punitive measures.
- Blindly following instructions is never okay. For example, if a classmate tells you "Do X, then do Y, then Z" without understanding why, even if you implement it yourself, you are engaging in academic dishonesty.
- In general, copying any code from anywhere that you do not fully understand is academic dishonesty.
- It is also academic dishonesty if you are on the other side of the transaction - i.e., giving a classmate instructions or sharing your code for a classmate to copy is academic dishonesty.
- If you still are unsure about whether a specific behavior constitutes academic dishonesty, don't do it - instead, ask me, and I will happy to clarify for you!

If I suspect academic dishonesty has occurred I may take any necessary actions, ranging from giving you a 0 on the assignment up to and including approaching the CS department regarding expulsion from the university.

I am here to help you, not out to get you, and I do not wish to enforce academic integrity through fear. I much prefer to provide you with the necessary resources so that you do not feel compelled to resort to academic dishonesty. Academic dishonesty will assuredly hurt your future in the field of computer science, so even if you find ways to cheat the system and squeeze through the cracks, you will ultimately be cheating yourself, which is the greatest and most permanent punishment you could receive.

7 Grading Policy

7.1 Grading Scale

A	B+	B	C+	C	D	F
$\geq 90\%$	$\geq 85\%$	$\geq 80\%$	$\geq 75\%$	$\geq 70\%$	$\geq 60\%$	$\geq 0\%$

To pass this class, you must obtain above a 60% average throughout the class AND at least above a 65% average on Projects 1 and 2.

7.2 Grade Breakdown

7.2.1 Assessments

- Projects (60%)
 - Project 1 (10%)
 - Project 2 (20%)
 - Group Project (30%)
- Participation/Assignments (25%)
- Exams (15%)
 - Midterm Exam (7.5%)
 - Non-Cumulative Final Exam (7.5%)
- Micropoints (Extra Credit/Small Rewards)

7.2.2 Late Policy

All work (homework, projects, and exams) must be turned in by 11:59PM EST on the due date in order to receive full credit. If you have extenuating circumstances that are COVID-19 related or university-approved (such as illness or death of a loved one), please let me know and I'm willing to work towards a solution. Evidence will be helpful in this circumstance.

If you are struggling to do your work on time, please note that coming to office hours is the best way to catch up on homework. I also tend to be flexible with deadlines with people who regularly come to office hours :)

- **Projects**
If your project will be late, you must submit the following write-up **before** the project deadline to earn additional days or submissions.

Write-ups must include answers to the following questions:

- Did you let me know as soon as you realized you can't submit the project on time? If not, why didn't you?
- Can you change something next time to prevent a late submission?
- How can late work and ineffective communication negatively impact your career?

If your write-up is approved, the following late penalties apply:

- Project 1: 20% off per 24 hour extension, up to 48 hours (including weekends)
- Project 2: 20% off per 24 hour extension, up to 48 hours (including weekends)
- Group Project: No late days permitted

- **Assignments**

Assignments will be due by 11:59pm the day after the lecture. Assignments that are not turned in on time without telling me in advance will automatically receive a 0. I generally do not accept any late work, but if I am notified in advance of a university-approved excuse, then any further extensions of deadlines are at my sole discretion. I will try to be accommodating as long as you give me sufficient notice.

7.3 Assignments

Assignments will be given during most classes. They will mostly cover the material covered during that class or the previous class. If you are present and engaged in class, these assignments should be straightforward.

Some classes will also include group or individual activities during class to reinforce the material taught that day. These will be graded more on effort and completeness rather than correctness.

There are no makeups for missed in-class activities unless you have an excused absence. If you have an excused absence (i.e., illness, family emergency, etc.) or COVID-related issues, simply let me know as soon as you can and I will be as flexible as possible.

7.4 Projects

60% of your grade in this class will be based on your performance on the three projects. They are intentionally spaced out through multiple weeks. As a result, you will be expected to complete them incrementally every week, and **your weekly progress will be evaluated in your final grade.**

These projects build on each other and doing the Group Project is not possible without mastering the concepts of the first two projects first. To this end, you must obtain above 65% on both of the first two projects to participate in the final project and to pass this class. I will do my best to intervene if anybody is on track to fail this class after Project 1.

Projects are especially subject to the rigorous academic integrity principles as outlined earlier in the syllabus.

7.5 Exams

There will be one midterm during the semester and one final assessment. Both exams will be non-cumulative and may cover any materials (technical or non-technical) from the class. Each exams is worth 7.5% of your final grade in the class.

Exams will **not** be during common exam times. Both exams will be take-home exams that you will have at least 24 hours to complete, and you are not permitted to work together with any other individual on these exams. Online resources, course materials, lecture videos, and solutions to homework assignments are fine to reference while doing the exam.

While the exams in this class are not heavily weighted, I urge you not to cheat or plagiarize on the exams in any way. Any suspicion of cheating on these exams will result not only on a 0 on the exam, but will also automatically be reported to the Department.

7.6 Extra Credit

Student Teach 4%

Please do not use this extra credit opportunity in lieu of putting in effort on other assignments! This opportunity will take significantly more time and energy than getting things right on regular assignments and projects, so you should not prioritize this assignment until you have done your best on all other work in the class.

One of the most efficient ways to master a concept is to teach it to others. On that note, you will have the opportunity to teach a concept or review a particularly challenging concept for 4% extra credit towards your final grade. This will involve all of the following steps:

- Making a lesson plan that summarizes the key points of a technology or concept
- Creating easily digestible lecture notes that summarize these key points
- Writing sample exam questions that cover this topic or technology
- Preparing a 5-10 minute demo that will either a) be presented live to the class, or b) be recorded and uploaded on YouTube.

To arrange for this extra credit opportunity, you must contact me on Slack/email. At that point, I will assign a topic you must prepare the teach for. I will be posting detailed documentation on each of the steps above for your reference.

Micropoints 10 micropoints for 1% extra credit/small virtual rewards

Micropoints are given out at my/TAs' discretion for going above and beyond the expectations of the class. Note that these are not points for good behavior or for being nice - they are meant to be recognition for encouraging discourse among students, classroom culture, or supplemental learning. Some examples are below, but please note that these are not exhaustive! Be creative in your engagement in class and you will be rewarded micropoints.

- Asking detailed questions (on Slack or in class) about subject material

- Posting reference materials for additional resources
- Helping other students understand materials on a deeper level on Slack/during lecture
- Making small demos of APIs that other students can use
- Creating study resources for exams
- Creating reference materials with learnings for projects

Ten micropoints can be redeemed either for 1% extra credit, or for a prize such as a month of music/TV streaming.

Extra Credit Problems on Assignments/Exams TBD

Please note that extra credit problems will often involve **significantly more effort** and are generally a more complicated class of problems than the regular credit problems. I strongly recommend that you complete all general problems to the best of your abilities before attempting any extra credit problems on assignments/exams.

8 Course Schedule - Section 1

Date	Topic (Subject to Change)	Milestones
09/01	1. Syllabus/Tools	Slack/Cloud9 Setup Due
09/02	2. What is Engineering?	Diagnostic Exam Due
09/09	3. Linux/Bash	Project 1 Assigned
09/15	4. HTML/Frameworks	
09/16	5. APIs/Source Control	
09/22	6. JSON/Heroku	Project 1 M1 Due
09/23	7. More Source Control	
09/29	8. Javascript	Project 1 M2 Due
09/30	9. JQuery/AJAX	Project 2 Assigned
10/06	10. React.js	
10/07	11. React.js	
10/13	12. Socket.io/Databases	
10/14	13. Databases/SQL	
10/20	14. Testing	
10/21	15. Testing	
10/27	16. Design Patterns/Inheritance	Project 2 Due
10/28	17. Software Development Cycle	Project 3 Assigned
11/03	18. Planning/Project Management	Midterm Exam Due
11/04	19. Requirements Engineering	
11/10	20. Requirements Engineering	
11/11	21. Ethics	
11/17	22. Guest Lecture	
11/18	23. Advanced Topic	
11/24	24. Advanced Topic	
12/01	25. Advanced Topic	
12/02	26. Advanced Topic	
12/08	27. Success in Industry	
12/09	28. Final Project Presentations	Project 3 Due
12/14	No Class	Final Exam Due

9 Course Schedule - Section 3

Date	Topic (Subject to Change)	Milestones
09/01	1. Syllabus/Tools	Slack/Cloud9 Setup Due
09/02	2. What is Engineering?	Diagnostic Exam Due
09/09	3. Linux/Bash	Project 1 Assigned
09/15	4. HTML/Frameworks	
09/16	5. APIs/Source Control	
09/22	6. JSON/Heroku	Project 1 M1 Due
09/23	7. More Source Control	
09/29	8. Javascript	Project 1 M2 Due
09/30	9. JQuery/AJAX	Project 2 Assigned
10/06	10. React.js	
10/07	11. React.js	
10/13	12. Socket.io/Databases	
10/14	13. Databases/SQL	
10/20	14. Testing	
10/21	15. Testing	
10/27	16. Design Patterns/Inheritance	Project 2 Due
10/28	17. Software Development Cycle	Project 3 Assigned
11/03	18. Planning/Project Management	Midterm Exam Due
11/04	19. Requirements Engineering	
11/10	20. Requirements Engineering	
11/11	21. Ethics	
11/17	22. Guest Lecture	
11/18	23. Advanced Topic	
11/24	24. Advanced Topic	
12/01	25. Advanced Topic	
12/02	26. Advanced Topic	
12/08	27. Success in Industry	
12/09	28. Final Project Presentations	Project 3 Due
12/14	No Class	Final Exam Due

10 Course Schedule - Section 5

Date	Topic (Subject to Change)	Milestones
09/02	1. Syllabus/Tools	Slack/Cloud9 Setup Due
09/04	2. What is Engineering?	Diagnostic Exam Due
09/09	3. Linux/Bash	Project 1 Assigned
09/11	4. HTML/Frameworks	
09/16	5. APIs/Source Control	
09/18	6. JSON/Heroku	
09/22	No Class	Project 1 M1 Due
09/23	7. More Source Control	
09/25	8. Javascript	
09/29	N/A	Project 1 M2 Due
09/30	9. JQuery/AJAX	Project 2 Assigned
10/02	10. React.js	
10/07	11. React.js	
10/09	12. Socket.io/Databases	
10/14	13. Databases/SQL	
10/16	14. Testing	
10/21	15. Testing	
10/23	16. Design Patterns/Inheritance	
10/27	N/A	Project 2 Due
10/28	17. Software Development Cycle	Project 3 Assigned
10/30	18. Planning/Project Management	
11/03	N/A	Midterm Exam Due
11/04	19. Requirements Engineering	
11/06	20. Requirements Engineering	
11/11	21. Ethics	
11/13	22. Guest Lecture	
11/18	23. Advanced Topic	
11/20	24. Advanced Topic	
11/25	25. Advanced Topic	
12/02	26. Advanced Topic	
12/04	27. Success in Industry	
12/09	28. Final Project Presentations	Project 3 Due
12/14	No Class	Final Exam Due