

GMU CS 491 Syllabus

Fall 2025

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Description

CS491, the Industry-Sponsored Senior Design Project is a two-semester, six credit course. Three credits count as CS Electives; three credits count as Senior CS Electives.

The goal of the course is to provide students with real-world development and project management skills by working with actual companies on real, non-academic projects. This approach helps the students develop the hard and soft skills needed to launch a successful career.

Industry sponsors submit a number of projects for the students to choose from. For each of these candidate projects, the sponsor provides an RFP (request for proposal).

Each student submits their project preferences. Every effort is made to align the students with their preferences. The students are then broken into teams. Each student team functions as if it were a small company that is contracted to the sponsor to perform the given project.

The student teams respond to the sponsors' RFPs with written proposals, in which each team describes its proposed solution to the project. The team and the sponsor meet and agree to the work to be performed, and then, over the course of two semesters, the team designs, implements, and delivers their solution.

Along the way, the team learns how to apply many of the skills learned in CS321, as well as the technical skills relevant to the team's particular project. Past projects have involved:

- Full stack development
- Operating System hardening
- Secure networking devices (cybersecurity defense)
- Data acquisition and analysis
 - Effect of weather on WiFi
 - Mitigating and minimizing ground traffic delays at airports
- Social media comment generators used to study the effects of sentiment on national policy
- Als used to help weed out corruption and fraud in the regulated drug markets
- Game-theory systems and AIs to help plan for all manner of geopolitical scenarios

There are only a few lectures per semester. The majority of the class meetings are reserved for mentor meetings (to help guide the teams' progress on their projects) and for team meetings (so that the teams can spend that time working on the projects themselves). The class lectures are largely dedicated to the "soft skills" that one needs in order to excel in a professional environment.

Classwork is assigned and collected via BlackBoard. There are no tests. There are three presentations to give (all three are updates on the team's project status). There is a final paper to be done by each team, documenting the project in IEEE format.

Learning Outcomes

- Customer interactions
- Project management
- Teamwork
- Application of the skills acquired in CS321
- Application and acquisition of technical skills (vary with project)

Textbook

No textbook.

Topics

- Proposals
- Requirements Traceability Matrix
- Teamwork
- Ethics
- Managing customers
- Development environments

Grading Policy

The course is graded on the Undergraduate Special scale. This scale allows for A+, A, A-, B+, B, B-, C+, C, C-, D, and F, as well as AB, IN, IP.

At the end of the first semester, students' grades will be calculated and sent to each student, but the semester's grade will as IP. At the end of the second semester, the second semester grade is recorded in the usual way, and the first semester's "IP" is replaced with the grade the student earned in the first semester.

Honor Code

All students are expected to abide by the GMU Honor Code and the CS Department's Honor Code policies. This policy is rigorously enforced. Review the university and department honor code and present any questions regarding the policies to instructor. Cheating on any assignment will be prosecuted and result in a notification of the Honor Committee as outlined in the GMU Honor Code.

Suggestions and Additional Policies

This class requires that students be self-motivated and able to work on teams. There are very few assignments (aside from reporting on the progress of your project) and no tests. The project is the work.

Disability Accommodations

Students with a learning disability or other condition (documented with GMU Office of Disability Services) that may impact academic performance should speak with me to discuss accommodations.

Schedule

Week	Date	Activity	Description
1	2025-08-29	Lecture 1	Class intro/projects
2	2025-09-05	Lecture 2	RFP process/writing proposals/teams
3	2025-09-12	Lecture 3	Project planning/project management
4	2025-09-19	Team time	
5	2025-09-26	Mentor meeting	Study prop due
6	2025-10-03	Team time	
7	2025-10-10	Lecture 4	Teams and teamwork
8	2025-10-17	Team time	
9	2025-10-24	Team time	
10	2025-10-31	Mentor meeting	
11	2025-11-07	Team time	
12	2025-11-14	Lecture 5	Communications
13	2025-11-21	Team time	
14	2025-11-28	break	Thanksgiving break
15	2025-12-05	Oral presentation	Present problem, tech, and solution

Activities

Lecture

- Introduce class & structure
- Introduce projects

Due

Nothing

Assignments

- Pick project
- Pick teams

Week 2

Activities

Lecture

- Reveal teams
- Business structure
- RFP Process
- Proposal writing

Due

Project/team choices (three days prior to class meeting)

Assignments

- Begin analysis
- Begin weekly reports

Week 3

Activities

Lecture

- Project Planning
 - o Waterfall vs. agile
- Project management
 - Deadlines and priorities

Due

• Weekly report - W3

Assignments

- Start doing weekly reports
- Contact sponsors
- Set up weekly meetings ½ h
- Start working on proposal

Activities

• Team time – work on your design/solution

Due

• Weekly report - W4

Assignments

• None

Week 5

Activities

Mentor meeting

Due

• Weekly report - W5

Assignments

• None

Week 6

Activities

• Team time – work on your design/solution

Due

- Weekly report
- Draft proposal

Assignments

• None

Week 7

Activities

Lecture

• Teams and Teamwork

Due

• Weekly report - W7

Assignments

None

Activities

• Team time – work on your design/solution

Due

• Weekly report - W8

Assignments

None

Week 9

Activities

• Team time – work on your design/solution

Due

• Weekly report - W9

Assignments

• Monthly report – October

Week 10

Activities

Mentor meeting

Due

• Weekly report - W10

Assignments

• None

Week 11

Activities

• Team time – work on your design/solution

Due

- Weekly report W11
- Monthly report October

Assignments

• None

Activities

Lecture

Communications

Due

• Weekly report - W12

Assignments

• None

Week 13

Activities

• Team time – work on your design/solution

Due

• Weekly report - W13

Assignments

• None

Week 14

THANKSGIVING BREAK

Activities

• None

Due

• None

Assignments

• None

Week 15

Activities

• Oral presentations

Due

• Weekly report - W15

Assignments

None

Assignments

Name	Week Due	Date Due	Description	Grade %	Team / Indv
Choose project	2'	2025-09-02	Due on Tuesday	1.00	Ι
Weekly Report	3	2025-09-12	1/12	1.00	Т
Weekly Report	4	2025-09-19	2/12	1.00	Т
Weekly Report	5	2025-09-26	3/12	1.00	T
PoC Proposal	5	2025-09-26	Proof of Concept Study	10.00	Т
Weekly Report	6	2025-10-03	4/12	1.00	Т
Weekly Report	7	2025-10-10	5/12	1.00	Т
Weekly Report	8	2025-10-17	6/12	1.00	Т
Weekly Report	9	2025-10-24	7/12	1.00	Т
Weekly Report	10	2025-10-31	8/12	1.00	Т
Monthly Report - Oct	10	2025-10-31	Oct Status	5.00	Т
Weekly Report	11	2025-11-07	9/12	1.00	Т
Weekly Report	12	2025-11-14	10/12	1.00	Т
Weekly Report	13	2025-11-21	11/12	1.00	Т
PoC Report	13	2025-11-21	Project Deliverable	10.00	Т
PoC Presentation	15	2025-12-05	Team pres w/indiv grades	10.00	_
Weekly Report	15	2025-12-05	12/12	1.00	Т
Monthly Report - Nov	15	2025-12-05	Nov Status	5.00	Т
Implementation Proposal	15	2025-12-05	Implement Solution	10.00	Т
Project Notebook	15	2025-12-05	Follow requirements	10.00	_
Customer satisfaction	15	2025-12-05	Cust submits to prof	10.00	1
Prof satisfaction	-	2025-12-05	No assignment	9.00	1
Attendance	*	2025-12-05		8.00	I
				100.00	Sum

Notes:

- All assignments must be submitted as PDFs
- In general, lateness costs ½ credit for the assignment
- "-" in the "Week Due" column means that students do not hand in this work

Assignment 01: Choose Project

Due	2025-09-02
Name	Choose Project
Requirements	Fill out the table below and submit to Canvas.
Score	1
Туре	Individual

Your Name	
1 st Choice	
2 nd Choice	
3 rd Choice	
4 th Choice	
US Citizen (y/n)	
Notes (preferred teammates, other considerations, etc)	

Assignment 02: Weekly Report - W3

Due	2025-09-12	
Name	Weekly Report – W3	
Requirements	Name	Provide team/customer name.
	Leader	List team members, indicate leader.
	Accomplishments	Describe accomplishments/meetings/activities
	Issues	Describe issues or say "no issues"
	Action Items	Need action, person responsible, & target date. 0.1 deducted for each item missing.
	Plans	Describe plans for next week
	Non-labor expense	Describe any actual costs
	Hours	Time sheet. List the number of hours each person worked this week.
Score	1	
Туре	Team	

Weekly Report Format

Make sure that it is neat, and that it includes the information listed above in the "Requirements". Label each section of the report. Include the date and page number in the footer on every page. Include the report title in the header on every page.

Team Meeting

Conduct your first team meeting. Recommend icebreaker to get to know something personal about each other. Rapport leads to good communication and builds trust and confidence, which is the basis of a healthy relationship).

Items that should be completed during your first team meeting are:

- Establish Team Meeting Schedule
- Decide Team Leader Schedule (provide name by month for both semesters)
- Read RFP and begin your analysis and design

It is also useful to take an inventory of the team members' skills and interests. This information is very useful in dividing and assigning tasks.

Customer

Conduct "Meet and Greet" Telecom or Meeting with your Customer. The purpose of this meeting is to introduce yourself to your customer, and to begin the customer relationship. Establish a "drum beat" – a series of regularly scheduled status meetings with your customer. These may be as frequent as weekly, but may only be every other week. Weekly is recommended, ever if the meetings are only ½ hour each.

Document the scheduling of this meeting on the Weekly Report. Once the meeting happens, document the discussion points and outcomes of the meeting on the Weekly Report.

Assignment 03: Weekly Report - W4

Due	2025-09-19	
Name	Weekly Report – W4	
Requirements	Name	Provide team/customer name.
	Leader	List team members, indicate leader.
	Accomplishments	Describe accomplishments/meetings/activities
	Issues	Describe issues or say "no issues"
	Action Items	Need action, person responsible, & target date. 0.1 deducted for each item missing.
	Plans	Describe plans for next week
	Non-labor expense	Describe any actual costs
	Hours	Time sheet. List the number of hours each person worked this week.
Score	1	
Туре	Team	

Assignment 04: Weekly Report – W5

Due	2025-09-26	
Name	Weekly Report – W5	
Requirements	Name	Provide team/customer name.
	Leader	List team members, indicate leader.
	Accomplishments	Describe accomplishments/meetings/activities
	Issues	Describe issues or say "no issues"
	Action Items	Need action, person responsible, & target date. 0.1 deducted for each item missing.
	Plans	Describe plans for next week
	Non-labor expense	Describe any actual costs
	Hours	Time sheet. List the number of hours each person worked this week.
Score	1	
Туре	Team	

Assignment 05: Proof of Concept Proposal

Due	2025-09-26	
Name	Proposal - Draft	
Requirements	Problem and Solution Cost and Management	Provide sufficient written detail that the product requirements and deliverables are sufficiently understood. Outline your plan to meet requirements At a minimum this section requires the following four items:
		 Organization Chart and Qualifications Work breakdown structure Project Schedule Project Cost - Weekly projected applied hours graph and estimated non-labor cost
	Suggested Outline	Cover Page Table of Contents 1 – Executive Summary (a clean paragraph that sums it all up) 2 – Description of Problem (details of the problem) 3 – Objectives (outcome you're striving for) 4 – Approach (how you will reach your outcome) 5 – Risks & Opportunities (what could go wrong or right) 6 – Equipment & Facilities (what tools/resources you will need) 7 – Deliverables (list of docs, code, reports, etc. – all work that you will "turn in") 8 – Management 8.1 – Organization Chart/Qualifications 8.2 – WBS (decompose the Approach and describe each task) 8.3 – Schedule (show WBS dependencies and hours to complete each task) 8.4 – Cost ("cost" here is expressed in hours to be worked)
	Formatting	Professional quality:
Score	10	·
Туре	Team	

Assignment 06: Weekly Report - W6

Due	2025-10-03	
Name	Weekly Report – W6	
Requirements	Name	Provide team/customer name.
	Leader	List team members, indicate leader.
	Accomplishments	Describe accomplishments/meetings/activities
	Issues	Describe issues or say "no issues"
	Action Items	Need action, person responsible, & target date. 0.1 deducted for each item missing.
	Plans	Describe plans for next week
	Non-labor expense	Describe any actual costs
	Hours	Time sheet. List the number of hours each person worked this week.
Score	1	
Туре	Team	

Assignment 07: Weekly Report – W7

Due	2025-10-10	
Name	Weekly Report – W7	
Requirements	Name	Provide team/customer name.
	Leader	List team members, indicate leader.
	Accomplishments	Describe accomplishments/meetings/activities
	Issues	Describe issues or say "no issues"
	Action Items	Need action, person responsible, & target date. 0.1 deducted for each item missing.
	Plans	Describe plans for next week
	Non-labor expense	Describe any actual costs
	Hours	Time sheet. List the number of hours each person worked this week.
Score	1	
Туре	Team	

Assignment 08: Weekly Report - W8

Due	2025-10-17	
Name	Weekly Report – W8	
Requirements	Name	Provide team/customer name.
	Leader	List team members, indicate leader.
	Accomplishments	Describe accomplishments/meetings/activities
	Issues	Describe issues or say "no issues"
	Action Items	Need action, person responsible, & target date. 0.1 deducted for each item missing.
	Plans	Describe plans for next week
	Non-labor expense	Describe any actual costs
	Hours	Time sheet. List the number of hours each person worked this week.
Score	1	
Туре	Team	

Assignment 08.5: Peer Review

Due	2025-10-24
Name	Peer Review
Requirements	For both yourself and for each of your teammates, please provide a numeric rating between 1 and 10 in each of the following categories: • Work ethic – are they putting in the time and effort required? • Technical ability – how well do they know their assigned area (or are they working diligently to learn what they need to learn)? • Team spirit – are they invested in the team's success? • Communications skills – do they share their ideas well?
Score	2
Туре	Individual

Assignment 09: Weekly Report - W9

Due	2025-10-24	
Name	Weekly Report – W9	
Requirements	Name	Provide team/customer name.
	Leader	List team members, indicate leader.
	Accomplishments	Describe accomplishments/meetings/activities
	Issues	Describe issues or say "no issues"
	Action Items	Need action, person responsible, & target date. 0.1 deducted for each item missing.
	Plans	Describe plans for next week
	Non-labor expense	Describe any actual costs
	Hours	Time sheet. List the number of hours each person worked this week.
Score	1	
Туре	Team	

Assignment 10: Weekly Report – W10

Due	2025-10-31	
Name	Weekly Report – W10	
Requirements	Name	Provide team/customer name.
	Leader	List team members, indicate leader.
	Accomplishments	Describe accomplishments/meetings/activities
	Issues	Describe issues or say "no issues"
	Action Items	Need action, person responsible, & target date. 0.1 deducted for each item missing.
	Plans	Describe plans for next week
	Non-labor expense	Describe any actual costs
	Hours	Time sheet. List the number of hours each person worked this week.
Score	1	
Туре	Team	

Assignment 11: Monthly Report – October

Due	2025-10-31	
Name	Monthly Report – October	
Requirements	Include: Date Project name Team/customer name Deliverables Key accomplishments Issues Schedule status Cost status Critical milestone dates Return to green plan Plans for next period Customer satisfaction Make sure the report is legible, clearly written, and professionally formatted.	
Score	5	
Туре	Team	

Assignment 12: Weekly Report – W11

Due	2025-11-07	
Name	Weekly Report - W11	
Requirements	Name	Provide team/customer name.
	Leader	List team members, indicate leader.
	Accomplishments	Describe accomplishments/meetings/activities
	Issues	Describe issues or say "no issues"
	Action Items	Need action, person responsible, & target date. 0.1 deducted for each item missing.
	Plans	Describe plans for next week
	Non-labor expense	Describe any actual costs
	Hours	Time sheet. List the number of hours each person worked this week.
Score	1	
Туре	Team	

Assignment 13: Weekly Report – W12

Due	2025-11-14	
Name	Weekly Report – W12	
Requirements	Name	Provide team/customer name.
	Leader	List team members, indicate leader.
	Accomplishments	Describe accomplishments/meetings/activities
	Issues	Describe issues or say "no issues"
	Action Items	Need action, person responsible, & target date. 0.1 deducted for each item missing.
	Plans	Describe plans for next week
	Non-labor expense	Describe any actual costs
	Hours	Time sheet. List the number of hours each person worked this week.
Score	1	
Туре	Team	

Assignment 14: Weekly Report – W13

Due	2025-11-21	
Name	Weekly Report – W13	
Requirements	Name	Provide team/customer name.
	Leader	List team members, indicate leader.
	Accomplishments	Describe accomplishments/meetings/activities
	Issues	Describe issues or say "no issues"
	Action Items	Need action, person responsible, & target date. 0.1 deducted for each item missing.
	Plans	Describe plans for next week
	Non-labor expense	Describe any actual costs
	Hours	Time sheet. List the number of hours each person worked this week.
Score	1	
Туре	Team	

Assignment 15: Proof of Concept Report

Due	2025-11-21		
Name	Proof of Concept Report		
Requirements	Your Proof of Concept Report should be a comprehensive summary of your project to date. At a minimum your report should include project objectives, challenges/issues, approach/architecture, solution/accomplishments, data model (if applicable), verification approach/results, schedule summary, customer deliverables provided, customer satisfaction lessons learned, and summary.		
	The most important thing, though, is that this report should show which approaches and technologies you evaluated, which you selected, and why.		
	The report should be highly professional and well written, just like the proposal. Points will be deducted if you don't have a professional document with a cover page with a date, table of contents, page numbers, figure/table captions, labels, and text introductions, etc.		
	Submit as a PDF via the Blackboard assignment link; one submission per team.		
	You must also provide this report to your customer no later than the due date. To demonstrate that you have done this, CC the professors when you send the report to the customer.		
	Ensure that your document includes:		
	 Cover sheet TOC and page numbers Project objectives Challenges and issues you faced Potential approaches and architectures you evaluated Solution selected Schedule summary (show how well you stayed on schedule) Customer deliverables Lessons learned (knowing what you know now, what would you have done differently?) 		
Coora	• Summary		
Score	10		
Туре	Team		

Assignment 16: Proof of Concept Presentation

Due	2025-12-05
Name	Proof of Concept Presentation
Requirements	Oral presentation of Study Report. Make sure that: Every team member speaks (prof wants to see evidence that all team members have contributed to the work) Describe the problem you're trying to solve Describe the technologies and methods you've investigated Describe what worked and what didn't and why Describe next steps (the solution that you will implement) Keep entire presentation under 8 minutes Make sure your slides are clean and effective. Don't read the slides to us. Recommended slides: Cover, Problem, Evaluated Technologies (maybe one slide for each), Selected Solution, Next Steps
Score	10
Туре	Team

Assignment 17: Weekly Report – W15

Due	2025-12-05	
Name	Weekly Report – W15	
Requirements	Name	Provide team/customer name.
	Leader	List team members, indicate leader.
	Accomplishments	Describe accomplishments/meetings/activities
	Issues	Describe issues or say "no issues"
	Action Items	Need action, person responsible, & target date. 0.1 deducted for each item missing.
	Plans	Describe plans for next week
	Non-labor expense	Describe any actual costs
	Hours	Time sheet. List the number of hours each person worked this week.
Score	1	
Туре	Team	

Assignment 18: Monthly Report - November

Due	2025-12-05	
Name	Monthly Report – November	
Requirements	Include: Date Project name Customer name Deliverables Key accomplishments Issues Schedule status Cost status Critical milestone dates Return to green plan Plans for next period Customer satisfaction Make sure the report is legible, clearly written, and professionally formatted.	
Score	5	
Туре	Team	

Assignment 19: Implementation Proposal

Due	2025-12-05	
Name	Proposal - Draft	
Requirements	Technical Problem and Solution Cost and Management	Provide sufficient written detail that the product requirements and deliverables are sufficiently understood. Outline your plan to meet requirements At a minimum this section requires the following four items: Organization Chart and Qualifications Work breakdown structure Project Schedule Project Cost - Weekly projected applied hours graph and estimated non-labor cost
	Suggested Outline	Cover Page Table of Contents 1 – Executive Summary (a clean paragraph that sums it all up) 2 – Description of Problem (details of the problem) 3 – Technical Objectives (description of what you will create) 4 – Technical Approach (how you will create it) 5 – Risks & Opportunities (what could go wrong or right) 6 – Equipment & Facilities (what tools/resources you will need) 7 – Deliverables (list of docs, code, reports – all work that you will "turn in") 8 – Management 8.1 – Organization Chart/Qualifications 8.2 – WBS (decompose the Tech Approach and describe each task) 8.3 – Schedule 8.4 – Cost ("cost" here is expressed in hours to be worked)
	Formatting	Professional quality:
Score	10	
Туре	Team	

Assignment 20: Project Notebook

Due	2025-12-05
Name	Project Notebook
Requirements	Deliver as a PDF Two entry types: Work logs At least weekly entries (inputs for weekly report) Recommend entries for every day worked Each entry should include:
Score	10
Туре	Individual

Assignment 21: Customer Satisfaction

Due	2025-12-05
Name	Customer Satisfaction
Requirements	The chief indicator of success in a business relationship is a satisfied customer. Ensure that you work closely with your customer. Be certain to communicate major issues, especially those that affect your ability to meet schedule and your ability to deliver the required deliverables.
	By the due date, contact your customer and ask them to rate your team as a whole AND each of the members of the team individually. These ratings should be on a scale of 1-10.
	For example:
	Team overall: 9 Alice: 10 Bob: 8 Carol: 5
	Ask your customer to email their ratings directly to the professor. Ratings will not be accepted from students – they must come directly from the customers. It's ok if the customers CC the teams with their feedback.
Score	10
Туре	Individual

Assignment A: Professor Satisfaction

Due	No due date. The professor provides this.
Requirements	Ensure that you contribute to your team's success, show enthusiasm and energy, and produce high quality work. Part of what this class hopes to teach is the importance of being a good team member and making good impressions. This "Quality Factor" is designed to capture that.
Score	9

Assignment B: Attendance

Due	8 meetings (see class schedule)	
Requirements	Attend the virtual meetings	
Score	8	