CSC491H1 F

Capstone Design Project

Fall 2025 Syllabus

Course Meetings

CSC491H1 F

Section	Day & Time	Delivery Mode & Location
LEC5101	Thursday, 6:00 PM - 9:00 PM	In Person: SM 2360

Refer to ACORN for the most up-to-date information about the location of the course meetings.

Class is on Thursdays from 6-9PM EST.

- If we are in person, we will meet in the DCSIL Lab in Gerstein Library
- If we are online, we will meet on Zoom

While some lecture material will be pre-recorded and available asynchronously online, the majority of the discussion-oriented lecture material will be presented during the weekly 6-9pm lecture slot. Any remaining time will be reserved for working periods, guest lectures, demos, further discussion, etc.

Students are expected to attend class times in order to work with their team, attend valuable tutorials, demo their work, and work with the instructor.

Course Contacts

Course Website: https://csc491.dcsil.ca

Instructor: Mrs Victoria Bukta
Email: victoria.bukta@utoronto.ca
Office Hours and Location: Office hours are by appointment.

Course Overview

This course is designed and delivered by industry experts from the Software/Tech fields. Students will work with teammates from CSC454H1 to develop a marketable startup on a selected theme.

The class will be small and highly interactive. You will work to develop working software industry best practices. You are expected to have experience writing software and be able to learn on the go.

For more details, visit our website at https://www.dcsil.ca/student-courses. Not eligible for CR/NCR option.

Students submit a single application for CSC491H1 and CSC454H1, describing relevant interests, experience, and skills and general academic history. Application questions are set and assessed by the instructor. Applications from St. George students enrolled in a Computer Science program or the Data Science Specialist program will be considered first. Applications by students from other programs with appropriate prerequisites will be considered as space permits.

Please visit https://q.utoronto.ca/courses/221753/pages/400-level-course-balloting-and-applications for application deadlines and details. A decision on your application will be confirmed approximately 2-3 weeks after the application deadline, so students should enrol in an alternate course until the results of their application are confirmed.

Students will write a software application that implements the business ideas developed in CSC454/2526 (Business of Software). This course will expose students to the core technologies, ideas, and processes in developing a startup.

Students will be given a theme, in the corequisite course (CSC454), in which to develop a startup. Students are expected to:

- Define their own scope of problem within the theme
- Develop a cohesive plan
- Produce a working MVP (minimum viable product)
- Present their work in various mediums, including written, orally, visually, and through the internet.

Class time will be a mixture of project-focused workshops, lectures, and discussions. The class will be small and very interactive. Students may hear from guest lecturers from the field.

Course Learning Outcomes

By the end of this course, students will gain practical experience in the full product development lifecycle, from initial concept to a working Minimum Viable Product (MVP). They will develop strong technical communication skills, both written and oral, crucial for presenting their work and collaborating effectively. The course emphasizes key aspects of project management, including prioritization, breaking down features, and iterative development. Students will leave equipped with the knowledge and skills to transform business ideas into tangible software solutions.

Corequisites: CSC454H1/ CSC2527H
Exclusions: CSCD90H3. NOTE: Students not enrolled in the Computer Science Major or Specialist program at A&S, UTM, or UTSC, or the Data Science Specialist at A&S, are limited to a maximum of 1.5 credits in 300-/400-level CSC/ECE courses.
Recommended Preparation: 2.0 CSC credits at the 300+ level, 0.5 additional credits at the 300+ level
Credit Value: 0.5

Expectations and evaluation of students
In general we expect students to come prepared to be guided, mentored, and to work hard throughout the term. This is not an easy course and there is a lot of work, but it is a course former students regularly describe as “having taught me more than all my other courses” and “having taught concepts I use on a daily basis as a software engineer”. Despite this, the teaching staff make themselves available via Slack as needed and will help guide and mentor

you. The teaching staff is here to help you succeed as long as you put the effort in, effectively contribute to your team, and communicate (that last one is important!). In order for students to be successful in this course and their team, here is a subset of expectations students should have:

- Students will actively participate in all assignments and communicate regularly with their team
    - Any absences will be communicated in advance to both the team and instructor.
- Students will write code and substantially contribute to their team's software/data stack.
    - Doing product or design work is great, but it is not a replacement for software in this course. Of course, if you are also designing or doing another role, we won't expect *as much* coding. Talk to the instructor to make sure you're striking a good balance.
- Students will adapt and self-teach any technologies their team chooses for their team's project (Instructor does not choose the techs).
- Students will record all work using GitHub Issues, GitHub Pull Requests, and learn the GitHub / Git platforms if required.

All of these expectations are in place, combined with mentorship and guidance, so that we can evaluate your ability to:

- Write software and learn new technologies as required
- Design and architect software systems
- Manage and execute software projects
- Collaborate with other roles (business, finance, etc)
- Set up a robust "Software Development Lifecyle" (SDLC) including continuous integration, testing, and deployments

With these expectations and evaluation principles, we know you'll be better prepared for the software industry.

Course Materials

There aren't any *required* materials *per se*, but it is required that you bring a laptop to class with a fully functioning developer environment for your project. iPads/tablets are not recommended as the main vehicle unless you can develop on them.

You will also need a GitHub account.

For this term, you will also need to create a Databricks Free Edition account.

Marking Scheme

Assessment	Percent	Details	Due Date
A1 - Team Introduction, Team Setup	2%	Create a blank repository in the DCSIL organization on GitHub for your team using the GitHub template here. This repo will act as your company's "homebase" and will contain design assets, company policies, marketing plans, etc. This repository should not contain your code. Please make new repositories in the DCSIL organization for your application code separately. The intention of this assignment is to kickstart your company with a basic foundation and be a forcing function to get your team acquainted with each other. It will also see you form your "team principles", a short 1-page description of the communication styles/requirements and responsibilities of your team and members. You will be expected to work together and submit this assignment as a team. Anyone can submit it, I suggest using an issue on the repo you're about to create to coordinate that submission (GitHub Issues are required to be created and used to coordinate work from all teammates, including CSC454/2527 people).	2025-09-08
A2 - Team Exploration - Bias and Diversity Reflection	2%	Your 2nd assignment will build directly off of your 1st assignment. By now, you should be well acquainted with the theme of the startups for this course, as well as your team. Your second assignment will be to identify areas where your team has expertise and where it may lack expertise. The intention of this	2025-09-15

Assessment	Percent	Details	Due Date
		assignment is to help you identify strengths and weaknesses of your team, explore your own unconscious bias, and evaluate the general diversity of your team. You will be expected to identify some potential bias your team may have given their life experiences and describe how these biases may impact the project. You will further be expected to identify where you need to bring in subject matter experts and where you could improve your team's diversity. You will be expected to work together and submit this assignment as a team. Anyone can submit it, I suggest using an issue on the team repo you created in A1 to coordinate that submission. The write-up should be written to your team repo, under team/diversity.md. Example from a previous term. (you should note this repo came from a previous iteration of this course, so some of the instruction was different. If you are unsure about something, err on the side of caution and use this term's instructions or ask me).	
A3 - CUJ Run through + Demo	6%	Your third assignment requires you to utilize another tool, documenting the process and your learnings. Critical User Journeys (CUJs) are essential to document and test. While product documentation typically outlines the ideal path for using a product, the actual user experience often differs. This variation depends on factors such as the user's	2025-09-25

Assessment	Percent	Details	Due Date
		persona, their familiarity with the platform, and any integration work they may be undertaking. For this assignment, you will define a specific goal you aimed to achieve with Databricks and thoroughly document the end-to-end process of setting it up. Subsequently, you will summarize both the successes and areas for improvement, offering recommendations on how the experience could be enhanced. Finally, you will present these findings in a written document and a brief three-minute class presentation.	
A4 - Initial Project Roadmap	9%	The intention of this assignment is to get an initial sense of the direction of your engineering focus. By now you should have had enough time with your teams to know what you're building. Given the project and the skills in your team, the goal of this assignment is to choose a tech stack, design an architecture diagram for your application, and fill out a roadmap. None of this is set in stone. These are initial plans and I will be highly sceptical if they are executed exactly as you plan here. The idea of this assignment is to get an initial sense of what you intend to do, the scope of work, and start planning the rest of the terms work. Since you can change your decision from this initial starting point, you should keep track of it. You will be expected to record in some way why the pivot happened and what caused the	2025-10-02

Assessment	Percent	Details	Due Date
		pivot to happen. A GitHub issue is a recommended place to record this decision.	
A5,6,8,9 Demos	32%	Throughout this course you will do a total of 4 progress demos. These demos are to showcase your incremental development process and decision making. This is an exercise often seen in industry, and you should be able to show off what you're doing without much prep. Insights through the course will maybe make you pivot what your building, how you build it, to create a great product. We expect all CSC491/2600 students to actively participate. Attendance is mandatory or you will receive a 0 for that section unless extenuating circumstances arrive. The demos should be (roughly) on these topics: Demo 1: Decisions and Tech Stack Present a "Hello World" application in your chosen language/platform. Explain the customer journey (CUJ) you plan to build and justify your technology choices, explaining how they support your product. Demo 2: CI and Testing Show your application running on a continuous integration (CI) system, including basic tests. Describe your test harness, the testing library you selected, and any challenges you encountered. Demo 3: Technical Problem Solving Detail a particularly difficult technical problem you've faced. Discuss the challenges encountered and how you resolved or are resolving them.	2025-10-09, 2025-10-16, 2025-11-13, 2025-11-20

Assessment	Percent	Details	Due Date
		Demo 4: General Functionality and Future Scope Demonstrate the main implemented use cases of your application. Identify any shortcomings or areas for improvement. List the remaining use cases to be completed. Demos should not be a high quality production. You can record your screen for a minute or 2, you can do it live, you can show us screen shots and discuss those… whatever you like. All we ask is that you show us progress.	
A7 - Competitive CUJ	6%	It's important to understand your competition. Similar to A3, for this CUJ you will try to use a competitor's tool and document the end to end process. You can later use this CUJ in your competitive analysis. For this assignment, identify a competitor tool that aims to achieve the same or a similar objective as your project. If a direct competitor isn't available, describe the common processes users undertake to complete the "job to be done" (JTBD) your project addresses. You will document the end-to-end process of setting it up. Subsequently, you will summarize both the successes and areas for improvement, offering recommendations on how the experience could be enhanced. You will also compare this experience to your own product. Finally, you will present these findings in a written document and a brief three-minute class presentation.	2025-11-06

Assessment	Percent	Details	Due Date
In-Class Participation	3%	Attendance and participation during classmate presentations. (Best 4/6) 1 Databricks CUJ presentation 1 Competitive CUJ presentation 4 Product Demos	No Specific Date
Final Software	40%	This is the final project for the course. You will deliver a functioning proof of concept.	2025-11-28

A1 Marking

Section	Description	Worth
Company Logo & Name	Good logo/name that represents a modern idea	5.0
Team Profiles	Team profiles include photos and profile links of all teammates, clearly lists expertises, and a short biography. This includes all CSC454 members.	10.0
Leader Selection	Tells us who they chose and why, what is their role for your team?	15.0
Team Principles	The team principles doc is a 1-page doc that covers: expectations of the team members, expectations for communication, roles and responsibilities, work delegation, etc. The document will cover the entire team including CSC454/2527 students. An example can be found here	55.0
Participation & Teamwork (Individual Grade)	Effectively worked as a team member and shared equitable work load during this assignment. Communication was regular and effective & acted in accordance with team principles.	15.0
	Total:	100

A2 Marking

Section	Description	Worth
Expertise	Describes how each team member's existing expertise can benefit the project Describes areas where your team may not have adequate	20.0

Section	Description	Worth
	expertise. This should include areas outside of engineering.	
Subject Matter Experts	Students identify areas where they may lack expertise and describes subject matter experts that can help fill those holes. Areas are more than surface-level deep (e.g. students don't just list out "engineering, will ask instructors to advise" or "industry partners"). Clear thought and care has gone into the rhetoric.	15.0
Unconscious Bias	The team has clearly given some thought into potential areas bias may occur and describes the situations. The writing clearly goes beyond surface level bias and the students have given serious thought about it. Writing also provides examples of possible solutions to help mitigate these biases.	20.0
Diversity	• Explain some areas, which you are comfortable sharing, where the team may lack diversity. You do not need to attribute statements to any individual team member, but you are welcome to do so if you are comfortable. • You do not need to feel pressured to share or pressure colleagues to disclose anything to the team or publicly, but for the dimensions folks are happy to share, it will give you the opportunity as a team to determine where you may have blind spots on your team. • Do not feel restrained by the subset listed above as there are many dimensions of diversity, visible and non-visible, that change how you experience the world. • Teams should aim to go beyond visible dimensions of diversity, though those should be included (e.g. gender, nationality, ethnicity). • Team gives thoughtful rhetoric on how these areas may impact their team and product	30.0
Participation & Teamwork (Individual Grade)	Effectively worked as a team member and shared equitable work load during this assignment. Communication was regular and effective & acted in accordance with team principles.	15.0
	Total:	100

A3 Marking

CUJ Document Rubric - 80 Points

Criteria	Description	Points
1. Assignment Info & Formatting	All required metadata (group name, student names & IDs, date) clearly presented. You have all requested sections and they are clearly identifiable.	/2
2. TL;DR (Max 65 words)	Clearly answers what it is, what it does, and why it matters; concise and informative.	/10
3. User Goal Statement	User goal is stated in ≤2 clear, goal-driven sentences at top of document.	/5
4. Persona Description	Persona is specific and detailed (experience level, platform familiarity, etc.).	/5
5. Tools Used	Clearly lists all tools/platforms involved.	/3
6. Summary of Findings (600 words)	Well-written, evidence-based reflection of the user journey; key issues and insights identified. Includes at least 3 of each; severity levels labeled accurately; table well-organized.	/20
7. Recommendations (Product + User)	Offers thoughtful, actionable product improvements AND advice for future users.	/10
8. CUJ Overview Table	Provides a concise, structured overview with relevant details of the journey. Contains the total time and switches.	/5
9. End-to-End Journey	Detailed step-by-step table with all 3 columns (step, notes, screenshot); includes time & context switches.	/20
TOTAL		80

CUJ Presentation Rubric - 20 Points

Category	Description	Points
1. Task / Goal	Clearly explained what the user was trying to do	/1
2. Key Takeaway	Summarized what they learned or discovered	/4
3. CUJ & Highlights/Lowlights	Presented key steps and pain points clearly	/2
4. End Product	Showed the final result or outcome of the journey	/4

Category	Description	Points
5. Product Recommendations	Gave clear ideas for improving the product	/2
6. Advice for Future Users	Shared helpful tips for the next user	/2
7. Presentation Quality + Q\&A	Easy to follow, clear speaking	/5
TOTAL		20

A4 Marking

Product Requirements (40%)

Criteria	Description	Weight
JTBD Statements	Well-articulated and actionable JTBDs tied closely to user needs and goals. Clear connection to CUJs.	10%
CUJs + UI/UX Sketches	3–6 CUJs that clearly connect to JTBDs and show thoughtful user flow. Includes relevant low-fidelity UI/UX sketches.	15%
Functional / Non-Functional Requirements	Comprehensive, well-organized list that accurately reflects scope, constraints, and system needs. These requirements are later reflected in the architecture and roadmap.	10%
Documentation & Clarity for Marking	All product research and requirements are well-documented in the correct location in the repo (`product_research/use_cases.md`). Clear and easy to understand for TAs.	5%

Architecture Design (40%)

Criteria	Description	Weight
Tech Stack Selection & Justification	Justify technology stack choices, detailing how each addresses specific use cases, aligns with project scope, and fulfills product requirements. Discuss trade-offs and provide comprehensive justification for any technology not fully meeting a requirement.	15%
Architecture Diagram	Clear, high-level diagram including all major components (DB, server, cache, etc). Appropriate level of abstraction. Includes a short write-up for clarity.	10%
Technical Alignment with Use Cases	Strong consistency between the chosen tech stack, architecture design, and the CUJs. Design supports planned	10%

Criteria	Description	Weight
	features.	
ADR Documentation (Architecture Decision Records)	All major decisions are documented in separate ADRs. Includes rationale, alternatives considered, and future update plans.	5%

Roadmap (20%)

Criteria	Description	Weight
Roadmap Structure & Detail	Roadmap is structured with short-, mid-, and long-term plans. All major components (infra, dev/test env, stack decisions) are represented.	10%
User Research & Launch Planning	Roadmap includes plans for user research and outlines a plausible low-fidelity launch timeline.	5%
GitHub Integration (Projects / Milestones / Issues)	Roadmap effectively uses GitHub tools (Projects, Milestones, Issues). Items are well-labeled and logically sequenced.	5%

A5,6,8,9 Marking

Part 1: Presentation (40 Points)

Criteria	Description	Weight
Clarity & Structure	Demo is clearly structured, with a logical flow from start to finish. Effectively communicates decisions, challenges, and changes as a development story	10
Live Walkthrough	Application or artifacts shown live or clearly through screenshots; presenter walks through live progress effectively	10
Progress & Relevance	Shows meaningful progress relevant to the demo's goal (tech choice, CI, problem-solving, or use cases)	15
Time Management	Demo is within 6 minutes, uses time effectively	5

Part 2: GitHub Release (60 Points)

Criteria	Description	Weight
Progress Paragraph	Clear summary of what's been completed and progress made	15
Issue Summary	Outline the created issues that were opened and closed during the release cycle.	10
Roadmap/ Architecture/ Research Summary	Includes at least 3 components (JTBD, architecture, roadmap, etc.), with meaningful updates. Components include, Architecture UI/UX Research Decisions Log Milestone Update Jobs to be done (JTBD) At least 2 of our releases should include user research.	20
Decisions & Change Logs	Thoughtful and well-documented decision logs and issue summaries	15

A7 Marking

CUJ Document Rubric - 80 Points

Criteria	Excellent (Full Points)	Points
1. Assignment Info & Formatting	All required metadata (group name, student names & IDs, date) clearly presented. You have all requested sections and they are clearly identifiable.	/2
2. TL;DR (Max 65 words)	Clearly answers what it is, what it does, and why it matters; concise and informative.	/10
3. User Goal Statement	User goal is stated in ≤2 clear, goal-driven sentences at top of document.	/5
4. Persona Description	Persona is specific and detailed (experience level, platform familiarity, etc.).	/5
5. Tools Used	Clearly lists all tools/platforms involved.	/3
6. Summary of Findings (600 words)	Well-written, evidence-based reflection of the user journey; key issues and insights identified. Includes at least 3 of each; severity levels labeled accurately; table well-organized.	/20
7. Recommendations and Competitive Analysis	Offers thoughtful, actionable product improvements AND competitive analysis.	/10
8. CUJ Overview Table	Provides a concise, structured overview with relevant details of the journey. Contains the total time and	/5

	switches.	
9. End-to-End Journey	Detailed step-by-step table with all 3 columns (step, notes, screenshot); includes time & context switches.	/20
TOTAL		80

CUJ Presentation Rubric - 20 Points

Category	What to Look For	Points
1. Task / Goal	Clearly explained what the user was trying to do	/1
2. Key Takeaway	Summarized what they learned or discovered	/3
3. CUJ & Highlights/Lowlights	Presented key steps and pain points clearly	/2
4. End Product	Showed the final result or outcome of the journey	/2
5. Product Recommendations	Gave clear ideas for improving the product	/2
6. Competitive Analysis	Outline how your product compares.	/5
7. Presentation Quality + Q&A	Easy to follow, clear speaking	/5
TOTAL		20

Final Software

Group Grade
Final Software Software 50%
Presentation 20% Live Demo, Architecture, Outline learnigs and pivots.
Poster Project 20% Interactive demo

Individual Grade
Reflection 10%

Rating Scale

This scale is used for each line of the rubric above.

Rating	Result
Outstanding	100% of pts
Strong	80% of pts
Acceptable	60% of pts

Rating	Result
Insufficient	40% of pts
Unacceptable	0% of pts

Late Assessment Submissions Policy

Late Policy Students are expected to work diligently to pass their assignments in on time. This course is intended to partially model a startup, however it is still a university course. Assignments also take time to mark and lecturers/TAs schedule their time according to the course calendar. We ask that you be respectful of their time by not passing assignments in late. Mark Deductions Assignments will be accepted up to 5 days past the due date at -10% per day. Days Late Percent Lost 1 -10% 2 -20% 3 -30% 4 -40% 5 -50% 6+ -100% NOTE: This policy is slightly different for synchronous demos. Please see that assignment for further details on the late policy. Asking for an Extension Accommodations can be made by talking to the instructor. They are not guaranteed, however, but we do like to model a startup so they usually are acceptable! :) Extensions that are requested within 6 hours of the due date will incur a penalty of 1 day, so please do not wait until the last minute to communicate with the instructor. Compounding assignments These assignments are, generally, made to compound one another. While assignments may be late and you may lose 100% of the marks, you must still complete them to work on the following assignments.

Course Schedule

Week	Description
Week 1	**First day of class, Introductions & Course Overview** • Hour 1: Intro in to the course • Hour 2: Mingle • Hour 3: Technical Workshop (Setting Up Github)
Week 2 Date	**Prioritization & Project Management** • Hour 1: Lean Product Dependment • Hour 2: CUJs + Project Management Overview of A3 • Hour 3: Team Exploration Exercise (TA Run) Overview of A2
Week 3 Date	**Guest Lecture and Workshop (Victoria Away)** • Hour 1: Jake Zhou from Wiz Robotics From Zero to Product • Hour 2&3: Workshop run by TA
Week 4	**Technical Decision Making & Strategy**

Date	• Hour 1: CUJ Presentation • Hour 2&3: Technical Decision Making
Week 5 Date	**Testing, CI & Deployments** • Hour 1: Testing for Success • Hour 2&3: Workshop (setting up testing infra)
Week 6 Date	**Technical Speaking, Writing** • Hour 1 & 2: Student Demos • Hour3: Technical Speaking, Writing
Week 7 Date	**Competitive CUJs** • Hour 1 &2: Student Demos • Hour 3: Competitive Workshop We will spend time understanding the experience of your competitor's product.
Week 8 Date	**Reading Week**
Week 9 Date	**Data Platforms - Ingest, Storage, Analytics, and AI/ML** • Hour 1&2: Present Competitive CUJ • Hour 3: Data platforms
Week 10 Date	**Guest Lecture - TBD** • Hour 1: Guest Lecture TBD • Hour 2&3: A8 - Demo 3
Week 11 Date	**Guest Lecture - AI Safety** • Hour 1: Guest Lecture - TBD • Hour 2&3: A9 - Demo 4
Week 12 Date	**Final Day Of Class** ❗ Due: FINAL Presentations Poster Showcase!

Policies & Statements

Late/Missed Assignments

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Mark Deductions

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Days Late	Percent Lost
1	-10%
2	-20%
3	-30%
4	-40%
5	-50%
6+	-100%

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