CS 362 Group 17 Project Proposal

1. Team info

- List each team member and their role in the project.
    - Team Leader: Samuel Jamieson
    - Code Quality Enforcement Officer: Oscar Ludwig
    - Document Review and Assurance Officer: Jacob Porter
    - Chief Coding Officer: Kai Turner
    - Communication Officer: Andrew Vu
    - Research and Resource Coordinator: Cameron Dilworth
- Link to each project relevant artifact such as your git repo and or project management system
    - Github: https://github.com/srj0407/Group17-Project
    - Trello board: https://trello.com/b/JSf9TgUc
- List communication channels/tools and establish the rules for communication.
    - Microsoft Teams: team and project related discussion, meeting times and updates.
    - Communication rules: Be respectful to team members, work constructively to resolve differences, and respond in a timely manner.

2. Product description

Team name: Project Painter

    - Samuel Jamieson, Oscar Ludwig, Jacob Porter, Andrew Vu, Cameron Dilworth, Kai Turner.
- **Abstract:** The first paragraph of your document must be an abstract (or executive summary, or TL;DR) that explains your project at a high level. If someone read nothing but that one paragraph, what do you want them to know?
    - In modern educational environments, Canvas has become a mainstay in both higher and lower educations. While Canvas offers a robust learning platform, its interface and other functionalities are severely lacking. These shortcomings fail to meet the needs of both students and instructors alike. It only further exacerbates the communication gap between students and instructors. This project aims to develop a Google Chrome extension that will better the user experience and attempt to fill many of Canvas's shortcomings. This project will improve upon canvas productivity, accessibility, and engagement with its growing student and

instructor population. Building an entirely new system for students to interact with would be impractical for students, as the transition from one interface to another requires time and commitment to learning a system when most students are already stretched on time. This extension would aim to solve many of the shortcomings of canvas while not changing the primary interface. It is suitable to fix many issues with a simple upgrade package marketed to simplify students' experiences to allow for greater efficiency. This extension aims to reduce the efficiency problems with Canvas as a learning platform without sacrificing the familiarity it has gained with students and instructors.

- **Goal:** What are you trying to do? For example, what task or problem will your system help users with?
    - Improve student productivity, accessibility, and engagement with their classes. Tasks such as time management and communication are features of Canvas that lack in many ways. An example being that students often need to search through Canvas pages and/or syllabuses that have much more info (noise) disguising what they're searching for; leading to frustration and potential ignorance.
- **Current practice:** How is it done today, and what are the limits of current practice?
    - There is a "Better Canvas" extension that adds a couple of features we plan on implementing, but overall looks and interacts the same as traditional canvas. There's also "Tasks for Canvas" however that only adds a "completion wheel" to the side canvas to better display due dates and assignment progress.
- **Novelty:** What is new in your approach, and why do you think it will be more successful than other approaches? Do not reinvent the wheel or reimplement something that already exists, unless your approach is different.
    - We're not trying to re-create Canvas, we're just trying to improve its shortcomings. Outside a couple ideas, most of our goals are features that already exist in Canvas in some way, but the execution is poor and could use an update from a group of users that rely on it. Examples such as the Canvas Inbox being overlooked by just emailing professors directly, and having to search through a Canvas page or entire syllabus to find when TA office hours are that work with your schedule, and many more. Additionally, we plan to add accessibility features to make more people able to use canvas effectively and support people who may have trouble with its current user interface.
- **Effects:** Who cares? If you are successful, what difference will it make?
    - Improve student productivity, accessibility, and engagement with their classes. Students will spend less time frustrated with differing and confusing Canvas course pages, and spend more time finding the information they need as soon as they open the home page.
- **Use Cases (Functional Requirements):**

1. Jacob Porter

a. **Actors**: Student who wants to see TA times for their class
b. **Triggers**: Student needs help with completing their weekly assignment
c. **Preconditions**:
    i. Student is "Logged-in" to their school-related Canvas account

        ii. Student is on the “Dashboard”
        iii. Student has already filled in their TA times for the class in the table provided by the extension
    d. **Postconditions (success scenario)**: Student sees a table of TA hours for Monday-Friday of their desired class
    e. **List of steps (success scenario)**:
        i. Student “scrolls down” their Canvas Dashboard
        ii. Student views the “TA Times Table”
        iii. Student is able to see the TA times related to the class they're searching for
    f. **Extensions/variations of the success scenario**:
        i. Student does not need to “scroll down”
        ii. Student sees TA times of other classes too
    g. **Exceptions (failure conditions and scenarios)**:
        i. Student has no classes on their Canvas page
            1. Table is “empty”
        ii. Classes on their Canvas page don’t specify TA times
            1. Table is “empty”
2. Kai Turner
    a. **Actors**: A student in a class.
    b. **Triggers**: The student wants to see what grade they need on an assignment to achieve a grade in the class and how hard they need to try (how high their grade would be compared to previous grades).
    c. **Preconditions**: The student has an assignment and grade they want to see as well as previous class grades if they want to see how hard they need to try.
    d. **Postconditions (success scenario)**: The user is displayed the grade they need and percentile they would need to be in relative to their work.
    e. **List of steps (success scenario)**: The user inputs the grade they desire and the assignment they want to check. Then the program uses math to compute the results. Then the program displays the results.
    f. **Extensions/variations of the success scenario**: N/A
    g. **Exceptions**: failure conditions and scenarios: The student inputs a grade that cannot be reached, in which case the program will alert them and stop. The student may also have too few assignments to sample, in which case the program would alert them and only display the required grade and not the percentile.
3. Andrew Vu
    a. **Actors**: Students and instructors who prefer a customized theme for improved accessibility or visual comfort.
    b. **Triggers**: A student or instructor finds the default Canvas interface visually uncomfortable.
    c. **Preconditions**:
        i. The Chrome extension is installed and active.
        ii. The user is logged into Canvas.

d. **Postconditions (success scenario)**: The user applies a customized theme (e.g., dark mode) that persists across sessions.
e. **List of steps (success scenario)**:
    i. The user logs into Canvas using the Chrome browser with the extension installed.
    ii. The user opens the extension's settings menu.
    iii. The user selects a predefined theme (e.g., dark mode) or customizes colors manually.
    iv. The extension dynamically updates Canvas pages with the selected theme.
    v. The theme settings are saved locally and persist across user sessions.
f. **Extensions/variations of the success scenario**:
    i. The extension provides multiple predefined themes (e.g., high contrast mode, warm tones).
    ii. Users can share and download custom themes created by others.
g. **Exceptions (failure conditions and scenarios)**:
    i. The user selects a theme that causes readability issues > A reset option is available.
    ii. Changes to Canvas's DOM break theme application > The extension reverts to default or provides a warning.

4. Oscar Ludwig
    a. **Actors**: A student in a canvas course
    b. **Triggers**:A student who wants to quickly see a standardised layout of syllabus information
    c. **Preconditions**:
        i. The Chrome extension is installed and active.
        ii. The user is logged into Canvas.
    d. Postconditions (success scenario):
        i. User sees standardized information of Instructor and TA contact information and office hours and grading policies all in a table for easy reading
    e. **List of steps (success scenario)**:
        i. The user goes to https://canvas.oregonstate.edu/ to access their dashboard
        ii. The user selects a class with support for the standardized syllabus
        iii. The user selects the "Standard Syllabus" link on the middle-left sidebar
    f. **Extensions/variations of the success scenario**:
        i. The extension could have user entered information on the "Standard Syllabus" page or it could have data synced with an online database.
    g. **Exceptions: failure conditions and scenarios**:
        i. The link does nothing and no table is accessible
        ii. There is no link
        iii. There is no data filled for the class, so no information is visible
5. Samuel Jamieson

a. **Actors**: A student trying to keep track of what they need to do and trying to find motivation to complete it.
b. **Triggers**: A student who wants to see a neat and engaging to do list with incentives to complete tasks.
c. **Preconditions**:
    i. The Chrome extension is installed and working correctly.
    ii. The user is logged into canvas and is either on the home page or the calendar
d. Postconditions (success scenario):
    i. The user sees a list of tasks to do as well as an associated points system and rewards for completing assignments early. A colorful and engaging screen greets them with a number of custom options for decoration.
e. **List of steps (success scenario)**:
    i. The user logs into canvas and accesses the calendar feature to see the gamify section.
f. **Extensions/variations of the success scenario**: N/A
g. **Exceptions: failure conditions and scenarios**:
    i. The canvas extension is working incorrectly or is not properly installed or syncing with Canvas LMS.

6. Cameron Dilworth
    a. **Actors**: A student who is disorganized
    b. **Triggers**: A student wants to eliminate stressors about organization, and complete assignments with ease and minimal planning.
    c. **Preconditions**:
        i. The Chrome extension is installed and working properly
        ii. The user is logged into Canvas and linked their extension
    d. Postconditions (success scenario):
        i. The user sees an options menu and can navigate through, select preferences and save them.
    e. **List of steps (success scenario)**:
        i. User opens Canvas and is logged in
        ii. User selects the Extension menu
        iii. User navigates between each class
    f. **Extensions/variations of the success scenario**:
        i. Once saved, the preferences are updated and stay the next time Canvas is opened.
    g. **Exceptions: failure conditions and scenarios**:
        i. The extension shows up blank
        ii. The extension is not accessible
        iii. The extension is not installed correctly
        iv. The extension does not save any changes to the theme or preferences

- **Non-functional Requirements:**
    - The user's data should be protected and private from other users.

    - Users should be able to utilize all features of the extension in 6 clicks or fewer from a given canvas page
    - The extension should be easy to modify and improve without large rewrites to core functionality.
- **Technical approach:** Briefly describe your proposed technical approach. This may include what system architecture, technologies, and tools you may use.
    - To build a robust Chrome extension packed with functionality for Canvas LMS, the technical approach will need to include a planning phase, modular development, and an integration phase with the Canvas API.
        - **Requirements Analysis**
            - Identifying Core features: This means prioritizing enhanced notifications, email verification, a customizable side dashboard, and accessibility features.
            - Research into the Canvas API or alternatively Web Scrapers: Understanding the endpoints in the Canvas API for accessing assignment, grades, announcements, and profiles of the students and instructors.
            - Browser Extension Constraints: We will need to assess Chrome extension permissions, data storage limits, and script restrictions
        - **Architecture Design**
            - Modular Architecture:
                - Content Scripts: Inject scripts to interact with Canvas pages modifying DOM elements for customizing dashboards
                - Background Scripts: Handle long-running and data intensive processes like notifications and API polling
                - Features for other pages: Provide user interface for features like grade average, or adding assignments that don't exist yet.
            - Data Flow:
                - Canvas API pipes to the Background Script pipes to the content script, then pipes to the DOM.
                - Use Chrome's messaging system for communication pipelines
            - Storage: Use Chrome's local storage or IndexedDB for user preferences and cached data.
        - **Coding Languages**
            - Frontend:
                - JavaScript, HTML, and CSS for UI and DOM manipulation
                - React for creating dynamic and reusable components in popup and options pages
            - Backend:
                - Canvas API for fetching/updating user data

        - Background scripts for API interaction and data syncing. This process may also improve runtime speeds.
        - Firebase for email and account verification
    - Database:
        - Chrome Storage API for lightweight local data storage
        - IndexedDB for storing large amounts of data (Course Materials, User setting and preferences)
        - Firebase for email and account verification
- **Development Workflow**
    - Setup and Permissions:
        - Configure manifest.json for appropriate permissions within chrome
        - Define content script injection rules to target Canvas LMS URLs
    - Canvas API Integration:
        - Implement OAuth2 for secure authentication for Canvas LMS
        - Build utility function for API requests
        - Store API responses to reduce request frequency and improve load times
    - Feature Developments:
        - Faster Load Times: Fetching whitelisted linking within the current page, and holding them until the user clicks off the page.
        - Dark/Theme mode: Inject CSS dynamically into Canvas pages using content Scripts
        - Built in chat: Database to store and authenticate chat messages of students displayed on Canvas page
        - Email Verification: Separate website and email service for users to create an account and verify a school email
        - Gamify Calendar: Track students submission dates and give points based on how early assignments are submitted that can be used for visual updates to their “Calendar” in Canvas
        - Names and emails or Professors and TAs: Scrap HTML of pages to find keywords and create a table on the dashboard it to be visible all in one place
        - Assignment Averages: HTML/JS injection for seeing these numbers easier
        - Easy Access to Syllabus and Grading Policies/TA Office Hours: A table of quick access information like emails, office hours, grading policies, with the syllabus fluff removed and in a constant organization between classes either stored in a local chrome storage with the single

users content or the database with public user generated content
        - Automatic grade calculator (complicated): HTML/JS injection,adding a system that reads and analyzes grades to give users a summary of how they should move forward in the class
        - Hide Old Canvas Pages: hide canvas courses that are not properly removed from dashboard
    - UI Design:
        - Use React to build popups and options pages
        - Design simple to use, and intuitive interfaces with Material-UI or Tailwind
- **Deployment Plan**
    - Packaging:
        - Minify Javascript and CSS files for efficient loading
        - Generate an optimized manifest.json with accurate permissions
    - Publishing / Distribution:
        - Submit the files to the chrome extensions webstore
    - Updates:
        - Set up version control in manifest.json
        - Release bug fixes and new features if applicable
- **Risks:** What is the single most serious challenge or risk you foresee with developing your project on time? How will you minimize or mitigate the risk? Don't state generic risks that would be equally applicable to any project, like "we might run out of time".
    - Authentication (Stretch Goal):
        - Use OAuth2 to securely authenticate users with Canvas and a separate website
        - Ensure token storage is secure using Firebase
    - API Rate Limits:
        - Cache frequent API responses locally and refresh whenever possible to reduce load times within canvas
    - DOM Changes by Canvas:
        - Use robust Selectors and dynamic scripts to adapt Canvas updaters
    - Performance Optimization:
        - Minimize background script activity
        - Optimize DOM Manipulation to reduce load times and further lag
- **Subgroups and Assigned features**
    - Subgroup 1:
        - Assigned Features:
            - Canvas Side Menu per class with important information
                - Easier Access to Links (Syllabus)
                    - Possibly standardized table of syllabus information
                - Quick to view Info Table

                - Names and Emails of your professors
                - TA office Hour table
                - Grading Policies Page / table in Canvas
            - Fix 10am assignments appearing on the next day
            - Gamify Calendar on canvas (Due assignments sideboard)
        - Gamify Canvas Calendar (integrated into the side bar)
            - Points system
            - Cosmetic Rewards for Completing assignments
            - Additional points for completing assignments early
    - Assigned Stretch Goals if major features completed early:
        - AI Powered Ranked Importance of Announcements
        - Rate my Course Implementation
    - Members:
        - Samuel Jamieson
        - Oscar Ludwig
        - Cameron Dilworth
- Subgroup 2:
    - Assigned Features:
        - Faster load time
            - Pre - Cache web data while canvas loads to reduce load times
        - Accessibility Menu for cosmetic customization
            - Dark/Themes Mode
            - Hide Old Canvas Classes from Dashboard
        - Improve Grades Screen
            - Average Grade Feature / Assignment Averages
            - Add “What If” Assignments for future unseeable assignments on Grades Page
            - Automatic grade calculator (complicated)
    - Assigned Stretch Goals if major features completed early:
        - Friends in classes and view their grades
        - In-Built Canvas chat room per canvas class
            - Email verification
    - Members:
        - Kai Turner
        - Jacob Porter
        - Andrew Vu

- **Timeline:** Tentative high-level weekly goals for your project for the coming 9 weeks.
    - Week 1: Gather the group and discuss project ideas. Develop early plans on project requirements and group communication/understanding.
    - Week 2: Refine project, and create project sprint plans. Create and agree on a “Team Contract” to ensure everyone understands what is expected. Prepare the “Project Presentation” for Week 3 as well as complete Project Proposal.

- Week 3: Present “Project Presentation”. Split project group into two subgroups assigned to work on different features. These groups will be assigned their own sprint and timeline to follow. The research team will start to delve into what APIs we will be utilizing and how we will interface with the canvas API.
- Week 4: Start the first sprint goal for each subgroup. Gamify calendar for group 1, and faster load times for group 2.
- Week 5: Subgroup 2 finishes sprint 1 goals, and moves onto review of sprint 1. Beginning sprint 2 for subgroup 2, this can consist of planning and research for the next phase or starting the project sprint 2. Subgroup 1 continues with Sprint 1, should be on track for completion next week.
- Week 6: Subgroup 2 completes sprint 2 by end of week, subgroup1 completes sprint 1 by end of week, review of code will take place.
- Week 7: Both groups begin the final sprint for the development phase after code review has been completed.
- Week 8: Both groups should have completed sprint development phases by the beginning of the week, leaving time for beta and exhaustive testing the remainder of the week. Subgroups will be disbanded once both sprints are completed.
- Week 9: Beta testing results will be analyzed and compiled into a list of features that can be added, and the project will be reviewed and redesigned if needed.
- Week 10: Finalize any remaining requirements of the project and class assignments.

Additionally, add the following:

- 4+ major features you will implement.
  - Accessibility Menu for cosmetic customization
    - Dark/Themes Mode
    - Hide Old Canvas Classes from Dashboard
  - Canvas Side Menu per class with important information
    - Easier Access to Links (Syllabus)
      - Possibly standardized table of syllabus information
    - Quick to view Info Table
      - Names and Emails of your professors
      - TA office Hour table
      - Grading Policies Page / table in Canvas
    - Fix 10am assignments appearing on the next day
    - Gamify Calendar on canvas (Due assignments sideboard)
  - Gamify Canvas Calendar (integrated into the side bar)
    - Points system
    - Cosmetic Rewards for Completing assignments
    - Additional points for completing assignments early
  - Improve Grades Screen
    - Average Grade Feature / Assignment Averages

        - Add “What If” Assignments for future unseeable assignments on Grades Page
        - Automatic grade calculator (complicated)
    - Faster load time
        - Pre - Cache web data while canvas loads to reduce load times
- 2+ stretch goals you hope to implement.
    - AI Powered Ranked Importance of Announcements
    - Rate my Course Implementation
    - Friends in classes and view their grades
    - In-Built Canvas chat room per canvas class
        - Email verification

4. Process Description

Describe your quarter-long development process.

- Specify and **justify** the software toolset you will use.
    - We will be using JavaScript and HTML/CSS as it makes it easy for the project to be imported in most browsers, as well as being used throughout the web making it possible for us to implement our features.
    - We will also use VSCode to develop our extension, with its extensive toolset and extensions.
- Define and **justify** each team member’s role: why does your team need this role filled, and why is a specific team member suited for this role?
    - Team Leader: Samuel Jamieson
        - A Team Leader is necessary to ensure that we all have someone to report to, as well as someone to engage in communication with the professor. Samuel has created web extensions before, so he has the experience to guide the project as a whole. He also has lots of team and communication experience to ensure the group can successfully work together towards our goals.
    - Code Quality Enforcement Officer: Oscar Ludwig
        - A Code Quality Enforcer is necessary so that all code is readable by other group members, as well as passable for prototyping so that the feature is viable. Oscar has experience writing and reviewing code from an internship he participated in last summer, so he’s well qualified to so for our group this term.
    - Document Review and Assurance Officer: Jacob Porter
        - A Document Review and Assurance Officer is necessary so that the group can be confident in the completion and submission of assignments. Jacob help manage the assignments for his last group in Software Engineering I, so he has experience ensuring that everyone completes

        - their sections in group assignments, reviewing the work, and submitting on time.
    - Chief Coding Officer: Kai Turner
        - A Chief Coding Officer is necessary because the group needs someone who is knowledgeable to ask questions to, as well as get guidance from. Kai is competent in many aspects of software engineering, and was a leader in development in his previous Software Engineering I class.
    - Communication Officer: Andrew Vu
        - A Communication Officer is necessary so that the group can always be on the same page in and out of the classroom. Andrew is well-spoken and has lots of group work experience that he'll use to keep everyone informed and on track with the goals of the project.
    - Research and Resource Coordinator: Cameron Dilworth
        - A Research and Resource Coordinator is necessary so that the group can have someone to decide how and what the software should look and execute in order for it to be successful. Cameron has experience with web-development and research, meaning he can combine both previous and newfound knowledge to present to the group when questions arise.
- Specify and explain at least three major risks that could prevent you from completing your project.
    - Canvas being changed significantly or shut down.
    - Chrome or Firefox updating or modifying the extension code or how it is used.
    - Poor performance combined with unrealistic expectations from our team could lead to this project being incomplete.
- Describe at what point in your process external feedback (i.e., feedback from outside your project team, including the project manager) will be most useful and how you will get that feedback.
    - During the development process, we will be testing features with other OSU students to get feedback on the successes and shortcomings of our extension provide. This will be most useful when deciding what parts of a feature should or should not be present, along with gathering new ideas to make the product better.
- Test-automation and CI
    - Your test-automation infrastructure (e.g., JUnit, Mocha, Pytest, etc).
        - We use Jest for unit testing and Pytest for broader scoped testing. Pytest uses Selenium which loads the extension onto the browser.
    - A brief justification for why you chose that test-automation infrastructure.
        - We chose Jest for its ability to directly test javascript code and we choose Pytest because it supported Selenium and Python is a nice language to write quick scripts in.
    - How to add a new test to the code base.
        - Given both testing frameworks there are two ways to add a test. The first is to add a Jest test by adding a new test file and importing the script you want to unit test. For the Pytest unit test you must create a python script

and then probably download the page you want to do the test with and then use the common.py to open the page and run your test

- Your CI service and how your project repository is linked to it.
  - We Github actions to test on every commit and pull to main.
- A brief justification for why you chose that CI service.
  - It was super simple to setup through GitHub itself
- A pros/cons matrix for at least three CI services that you considered.

	Travis	**CircleCI**	**GitHub Actions**
Pros	1. Easy to Setup 2. Integrated with GitHub 3. Supports many Languages	1. Fast builds 2. Customizable 3. Integrated Docker Support	1. Native to GitHub 2. Completely Free 3. Has many pre-built actions to save time
Cons	1. Limited Free tier 2. Slow build times 3. Limited customization	1. More complicated to configure 2. Limited Free Tier 3. Less community support compared to others	1. Slightly complex to set up 2. Not super user-friendly 3. Time limits on execution for workflows (6 hours)

- Which tests will be executed in a CI build.
  - All the tests are planned to be executed
- Which development actions trigger a CI build.
  - As mentioned above pulls to main and commits to main trigger CI actions

i. Risk assessment

1. Canvas Changes
   a. **Likelihood**: medium
      i. Although changes to Canvas's native software could happen and would most likely cause most of/all the extension to fail, it's unlikely unless the

entire Canvas program is “redone,” something that isn’t reasonable to worry about for a while.

b. **Impact**: medium
    i. Similar to the likelihood, changes to Canvas could be detrimental, but only if they are “major” changes that are more or less “re-making” the software
c. **Evidence**:
    i. We’ve tested some simple features such as adjusting CSS and injecting our own HTML, CSS, and JS to see how the page reacts. For the scope of our project in its current state, there is nothing to worry about besides major layout changes to the Canvas site.
d. **Steps taken to Reduce Likelihood**:
    i. We will thoroughly test our features during development on multiple pages if required (such as the Dashboard, Home page of a class, Modules page of a class, etc.). Any other kinds of steps to take would be guessing future modifications to Canvas; not reasonable.
e. **Plan for Detecting Problem**:
    i. Not much to do outside of running the extension when updates to Canvas are made and verifying the extension still works as intended.
f. **Mitigation Plan**:
    i. Should Canvas change in some major way that it would “break” our extension/the interaction between the two would be harmful, the plan would be to isolate features to determine how each was affected, and make changes accordingly. If extension was public, reaction should be quick, depending on if we decide to maintain the project or not.

2. Chrome Web Store Problems

a. **Likelihood**: high
    i. There are many hoops and policies that would need to be followed in order to get our extension on the Chrome web store for public use. This would take lots of time that is unnecessary for the scope of this *class project*.
b. **Impact**: low
    i. It’s not necessary that we make this extension public, so it doesn’t really affect our project production; more post-class production.
c. **Evidence**:
    i. There is a long and time-consuming process to get an extension to be published and become public on the Chrome Web Store (look at reference).
        1. Link for reference: *https://developer.chrome.com/docs/webstore/publish/*
d. **Steps taken to Reduce Likelihood**:

i. If the plan was to get the extension on the Chrome Web Page, we would need to define policy that would impact the development of the extension and follow it accordingly. This would reduce the chances of the extension being denied upon review.

e. **Plan for Detecting Problem**:
   i. Similarly to the previous part, we would need to review what policies must be followed and completed prior to major development of the extension so that we have the best chance of being approved.

f. **Mitigation Plan**:
   i. If we were trying to make the extension public and were unable to, we would need to review our understanding of the policies required and verify with a help email that could answer any questions we had. This would then follow a full-review of our software to verify it follows policy.

3. <u>Ensuring features are fully usable and experience meets quality standards</u>
   a. **Likelihood**: medium
      i. As daily users of Canvas, we believe we have a good idea of its shortcomings and ideas for improvement; however, we are a small portion of a much larger consumer base that most likely have differing opinions.
   b. **Impact**: medium
      i. Functionality is most important for a minimum viable product which is most important; however, the balance between functionality and usability can be hard to lineup all the time and could make our software features “less functional” due to being unaware of reactions from input.
   c. **Evidence**:
      i. All of our group members have experienced lack luster user experience and poor usability in software (which is why we’re trying to “improve” Canvas…) so we understand from a first-hand account on how we can make software less functional.
   d. **Steps taken to Reduce Likelihood**:
      i. During development, we plan to test our features with potential users outside the project team, such as fellow students who use Canvas daily, just like us. This will give us a better idea on what makes a good user experience and not.
   e. **Plan for Detecting Problem**:
      i. Similar to last, our main detection for this problem with be during user test. We could also group this with a feedback form in-order to hone in on specific issues we are unsure of how to remediate.
   f. **Mitigation Plan**:
      i. If we get feedback from user tests that a feature (1+) are not creating a positive user experience, we would need to understand the feedback and

turn it into actionable changes to make to the software. This would then be followed by review with more user tests; repeat if necessary.

4. Unable to Populate Standard Syllabus Table — PDF parser
    a. **Likelihood**: high
        i. It's up to professor discretion to upload syllabus information in a PDF, or some other more readable format. Parsing PDF information is not easy and a major challenge for our "Standard Syllabus Table" that would need to look through it and get out key information.
    b. **Impact**: medium
        i. Depending on how many professors publish syllabus information as PDF, this could be very impactful, or irrelevant on the population of the "Standard Syllabus Table" as there could be a lot of missing information, or none.
    c. **Evidence**:
        i. Some group members understand the issue of PDF parsing (have tried tackling it), and we all have experience of uploading PDFs and them not being "parsed" well in websites such as resume uploads.
    d. **Steps taken to Reduce Likelihood**:
        i. Lots of time will be spent and information will be gathered to try to develop a way of being able to read most professor PDF's with a decent passing rate. There are no promises in the end as this is a beast in itself.
    e. **Plan for Detecting Problem**:
        i. We will test the PDF parser on all the PDF's professors have provided in our respective classes to verify it can grab the correct information from each. This should provide a decent amount of test cases, besides testing specific issues that the developer(s) of the feature would be aware of.
    f. **Mitigation Plan**:
        i. Similar to last, we would test multiple professor provided PDF's on our individual classes, as well as create test cases for the PDF parser to be utilized on to see how it either passes or fails.

5. We miss something in our test cases
    a. **Likelihood**: high
        i. There's a large range of input possibilities, such as the hundreds/thousands of differently setup classes on Canvas, that may might not foresee as test cases during the development of our project.
    b. **Impact**: low
        i. We're not trying to publish a "100% perfect" product in 10 weeks, rather a practical application that can give an idea of what we're trying to

accomplish. Additionally, the goal isn't to publish the extension on week 10; more time, testing, and review would be required before we do something like that.

c. **Evidence**:
    i. All group members have created software and had to test it. It's a common occurrence that a test case could be overlooked and negatively affect the functionality of software.
d. **Steps taken to Reduce Likelihood**:
    i. Have multiple group members who didn't make the code, create test cases and test the code. This will bring fresh eyes and clearer perspectives to ensure that we can cover as much *ground* as possible.
e. **Plan for Detecting Problem**:
    i. Similar to last, we plan to have group members who didn't write a "code" to test the "code". It's sometimes hard to think of all necessary cases for software you've been working for a long time; fresh perspectives can it be easier.
f. **Mitigation Plan**:
    i. Do this case testing throughout development so that major changes don't add to the issue. Incremental development and testing is valid in that we ensure new code is valid and covers most if not all test cases, instead of looking for a "need in a haystack".

Explicitly state how this has changed since you submitted your Requirements document.

- We've decided to do more testing of our software incrementally vs. when a feature is "finished." This is an issue we have more control over, as we can decide what to do with the software we create, not Canvas's. Our incremental testing will include user tests with fellow student who use Canvas and between each other, as well as using pytest and Jest for more software specific issues when applicable.

ii. Project schedule

- **Timeline:** Tentative high-level weekly goals for your project for the coming 9 weeks.
    - Week 1: Gather the group and discuss project ideas. Develop early plans on project requirements and group communication/understanding.
    - Week 2: Refine project, and create project sprint plans. Create and agree on a "Team Contract" to ensure everyone understands what is expected. Prepare the "Project Presentation" for Week 3 as well as complete Project Proposal.
    - Week 3: Present "Project Presentation". Split project group into two subgroups assigned to work on different features. These groups will be assigned their own sprint and timeline to follow. The research team will start to delve into what APIs we will be utilizing and how we will interface with the canvas API.
    - Week 4: Start the first sprint goal for each subgroup. Gamify calendar for group 1, and faster load times for group 2.
    - Week 5: Subgroup 2 finishes sprint 1 goals, and moves onto review of sprint 1. Beginning sprint 2 for subgroup 2, this can consist of planning and research for

the next phase or starting the project sprint 2. Subgroup 1 continues with Sprint 1, should be on track for completion next week.
    - Week 6: Subgroup 2 completes sprint 2 by end of week, subgroup1 completes sprint 1 by end of week, review of code will take place.
    - Week 7: Both groups begin the final sprint for the development phase after code review has been completed.
    - Week 8: Both groups should have completed sprint development phases by the beginning of the week, leaving time for beta and exhaustive testing the remainder of the week. Subgroups will be disbanded once both sprints are completed.
    - Week 9: Beta testing results will be analyzed and compiled into a list of features that can be added, and the project will be reviewed and redesigned if needed.
    - Week 10: Finalize any remaining requirements of the project and class assignments.

Member Scheduling

- *Samuel Jamieson*
    - Week 3: Begin work on my weekly assigned feature according to the Project Schedule after the project presentation has been completed.
    - Week 4: Continuing working on feature implementation as expected. Make sure weekly meetings with TA are happening consistently and accordingly.
    - Week 5: Proceed with Sprint 1 development for my assigned team. Implement backend API calls for sidebar as well as front end integration.
    - Week 6: Complete sprint 1 and authorize it for testing and review by other subgroups.
    - Week 7: Begin work on Gamify calendar points system. Ensure all Instructor checkpoints are met and the team is keeping with the assigned deadlines.
    - Week 8: Complete sprint 2 and authorized testing and for other subgroups. Begin beta testing and control group testing.
    - Week 9: Gather data from beta testing and assist other subgroups with other implemented features if needed.
    - Week 10: Wrap up final beta reviews and implement appropriate changes. Make sure the product is ready for deployment come week 11.
- *Kai Turner*
    - Week 3: Complete weekly assignments and begin developing my assigned feature.
    - Week 4: Finish a system to tell the user what grade they need on an assignment to get a grade in the class.
    - Week 5: Integrate a percentile based on the user's previous grades to the previous system.
    - Week 6: Program a system to load canvas web pages before they are visited.
    - Week 7: Using the previous system cache canvas links in the canvas site making it load faster.

    - Week 8: Assist with other features/development or take on another feature if assumed to be able to be completed by the end of the term.
    - Week 9: Continue to assist with other features/development or complete another feature.
    - Week 10: Wrap-up development and assignments.
- *Jacob Porter*
    - Week 3: Complete weekly assignments and begin developing my assigned feature.
    - Week 4: Continue developing my assigned feature so that it passes error handling.
    - Week 5: Complete my assigned feature and begin getting user feedback for it.
    - Week 6: Implement feedback from previous week, refine assigned feature based on feedback.
    - Week 7: Assist with other features/development or take on another feature if assumed to be able to be completed by the end of the term.
    - Week 8: Continue to assist with other features/development or work on another feature so that is passes error handling.
    - Week 9: Continue to assist with other features/development or complete another feature, get feedback if time permits.
    - Week 10: Wrap-up development, implement feedback if time permits.
- *Cameron Dilworth*
    - Week 3: Complete weekly assignments and begin developing my assigned feature.
    - Week 4: Finish implementation to where the user can select the “options tab” and close it
    - Week 5: Make sure different options can be selected and saved *these options do not need to work yet*
    - Week 6: Finish each different option and have them change the layout *make sure each option works*
    - Week 7: Get feedback from team and random users and implement new features/touch up
    - Week 8: Find and fix any bugs that come up during verification and validation
    - Week 9: Make sure other team members are finished, and assist where needed.
    - Week 10: Finish all assignments early and double check that all different features work smoothly together.
- *Oscar Ludwig*
    - Week 3: Complete weekly assignments, meet with my sub-group and start work on assigned features.
    - Week 4: Continue with assigned code development, attend TA meetings, answer any questions about code quality.
    - Week 5: Complete first feature assignment hopefully, possibly the standardized Canvas syllabus pages.
    - Week 6: Final touches to complete sprint 1 and write tests for my code for other sub-groups

    - Week 7: Begin working on next feature, possibly an extension of the standardized syllabus to sync with a database. This week would be finding a database to use and a design that other members approve of.
    - Week 8: Finish database sync and complete sprint 2. Start beta testing software.
    - Week 9: Assist members with software if needed, work on bug fixes for my code, ensure code quality.
    - Week 10: Finish assignments and Make sure code is ready for final submission.
- *Andrew Vu*
    - Week 3: Complete weekly assignments, meet with my sub-group to discuss feature development, and begin planning Dark/Theme Mode.
    - Week 4: Start code development for Dark/Theme Mode, attend TA meetings, and answer sub-group questions on code quality.
    - Week 5: Complete the first version of Dark Mode, integrate theme toggles, and start testing across Canvas pages.
    - Week 6: Finalize and polish Dark/Theme Mode, write unit tests, and integrate feedback for Sprint 1 completion.
    - Week 7: Begin extending Dark/Theme Mode to include custom themes and accessibility options; propose UI designs.
    - Week 8: Implement custom themes, finish Sprint 2, and start beta testing the Dark/Theme Mode feature.
    - *Week 9*: Assist with software integration, address bugs from beta testing, and ensure feature meets code quality standards.
    - Week 10: Finalize Dark/Theme Mode, ensure full functionality, and support the team in preparing for final submission.

iii. Team structure

Team Member Responsibilities

General Responsibilities

All team members are expected to:

1. Attend all scheduled meetings or notify the team at least 24 hours in advance if unable to attend.
2. Complete assigned tasks by the agreed-upon deadlines.
3. Actively participate in team discussions and decision-making processes.
4. Communicate openly and respectfully, addressing concerns or challenges promptly.
5. Support one another in achieving the team's goals and maintaining a productive work environment.
6. Adhere to the team's established code of conduct and project guidelines.
7. Adhere to good coding practices, commenting often, and thoroughly to ensure code can be properly tested and implemented.

8. Will test at least 1 other person's code and will submit their code for peer testing and review. (You cannot test your own code).

Specialized Roles and Responsibilities

Team Leader: Samuel Jamieson

- Oversees the project timeline and ensures progress aligns with deadlines.
- Facilitates meetings and sets agendas according to teams schedules.
- Mediates conflicts and ensures team cohesion.
- Acts as the primary liaison with the course instructor or external stakeholders.
- Can assist note takers for team meetings.

Code Quality Enforcement Officer: Oscar Ludwig

- Reviews code contributions to ensure adherence to coding standards and best practices.
- Provides feedback on code reviews and suggests improvements.
- Ensures that the codebase is clean, maintainable, and well-documented.
- Secondary Note taker for team meetings

Document Review and Assurance Officer: Jacob Porter

- Reviews project documentation for accuracy, clarity, and consistency.
- Ensures that all required documents are submitted on time and meet course requirements.
- Assists in the creation and editing of project reports, user manuals, and other written materials.
- Maintains version control of documentation files.
- In charge of GitHub and GitHub management, including PR requests and file cohesion

Chief Coding Officer: Kai Turner

- Leads development of any Web assembly components of the project.
- Establishes coding conventions and structure for the codebase.
- Provides feedback on code reviews and proposes improvements.
- Ensures that the codebase is clean, maintainable, and well-documented.
- Secondary Team leader

Communication Officer: Andrew Vu

- Maintains communication channels and ensures timely dissemination of information.
- Schedules meetings and shares meeting notes or action items.
- Serves as the point of contact for external inquiries and updates along with team lead.

- Ensures that all team members are informed of changes or updates.
- Acts as the primary note taker for team meetings on Notion or Google Drive.

Research and Resource Coordinator: Cameron Dilworth

- Conducts research to support the project, including technical solutions and tools.
- Compiles and organizes resources for team use.
- Identifies and evaluates potential risks or challenges to the project.
- Shares findings with the team to facilitate informed decision-making.

iv. Test plan & bugs

1. Unit Testing

a. Aspects to Test:

i. Functionality of Individual Modules and or Functions: Ensure that each function and module performs as expected.

ii. Edge Cases and Error Handling: Validates how the system handles unexpected inputs and boundary conditions.

iii. Performance of Critical Functions: Assess time complexity and efficiency.

b. Testing Approach:

i. Using pytest to run selenium to test browser extension features, while using Jest for smaller scaler non-browser testing.

ii. Automating unit tests through github actions to make sure that we integrate programs successfully.

iii. Important Tests Include:

1. Expected Vs. Actual Output for Computational functions
2. Handling of invalid inputs or metadata
3. Consistency in response times for the extension and canvas as a whole

c. Testing Suite

i. Functionality Testing: Validate Core features individually.

ii. Boundary Testing: Test input extremes as in minimum and maximum values.

iii. Exception Handling Tests: Verify robustness against invalid data.

2. System Testing

a. Aspects to Test:

i. Module Interactions: Ensure the flawless integration between several components.

ii. Data Flow: Validate correct data handling across the system

iii. External Dependencies: Test interactions with Canvas API or other APIs that may be used and system libraries.

b. Testing Approach:

i. Conduct end to end testing using Selenium, powered by pytest for integration of testing frameworks.

ii. Automate testing execution in a staging environment before deployment.
iii. Perform regression testing to verify new features.

v. Documentation plan

Outline a plan for developing documentation that *you plan to deliver with the system*, e.g., user guides, admin guides, developer guides, man pages, help menus, wikis, etc.

Overview

To ensure ease of use simplification of the educational process, Our Project will include documentation primarily aimed at students/users. The documentation we have will be structured into a website describing each setting and general information the user might need.

User Guide for students

The goal will be to create a Help & Info button designed to provide users with a brief description of each button and setting available in the Project Painter Chrome extension. When clicked, it will direct users to a page containing explanations of the extension's features as well as the purpose of each of the buttons and settings.

Steps:

1. Identify each button and setting that will be implemented and draft the initial documentation for each of these planned buttons
2. Get feedback from TAs, team members, and the professor about potential changes
3. Finalize the documentation and implementation for each of the settings and buttons on the extension and have a web page that explains what each button does in a short paragraph.

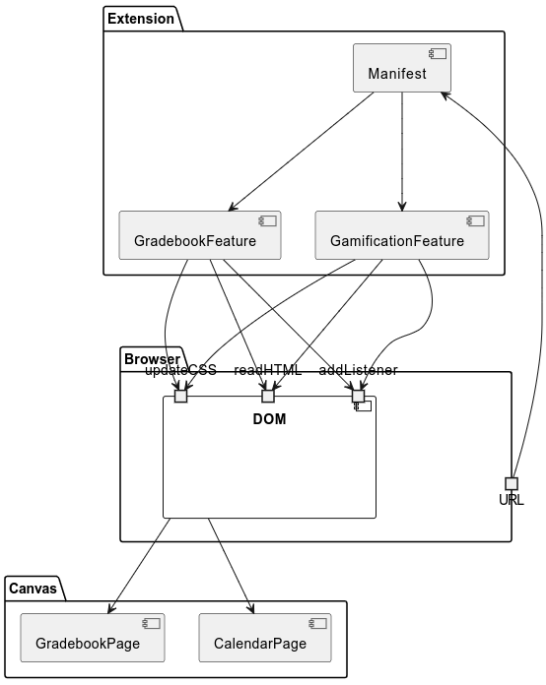
Documentation Development Process

1. **Draft Initial Documentation:**
    - Establish an outline for each button or setting
    - Define key topics and features to be covered.
2. **Review and Iterate:**
    - Gather feedback from team members, TAs, class volunteers, and the professor
    - Revise content based on feedback.
3. **Finalize and Publish:**
    - Upload to appropriate platforms (GitHub, extension website, in-app help section).

1. Software architecture

Provide an overview of your system. Specifically:

- Identify and describe the major software **components** and their functionality at a conceptual level.
    - Canvas styling
    - Gradebook features
    - Gamified calendar
    - Faster Load time
    - Sidebar
- Specify the **interfaces** between components.
    - There are few interfaces between components due to the nature of Chrome extensions and the fact that the they interface directly with Canvas and Chrome
    - The canvas styling interfaces with the CSS behind canvas
    - Gradebook features interfaces with the gradebook page in canvas
    - The gamified calendar will interface with the canvas calendar and the local storage of chrome
    - The faster load time will interface with every page in canvas
    - The sidebar interfaces with the syllabus page and other class related pages
- Describe in detail what **data** your system stores, and how. If it uses a database, give the high level database schema. If not, describe how you are storing the data and its organization.
    - We will store stuff in the chrome storage local for the sidebar and gamified calendar. Local storage is a JSON like format so the sidebar will have data corresponding to specific classes stored such as the TA times and the gamified calendar will likely store info for individual assignments and general game scores
- If there are particular **assumptions** underpinning your chosen architecture, identify and describe them.
    - Yes, we are assuming that there is a degree of separation between the features allowing to in essence act as distinct extensions alone and allowing for a framework where each feature is separated.
- **For each of two decisions pertaining to your software architecture**, identify and briefly describe an **alternative**. For each of the two alternatives, discuss its pros and cons compared to your choice.
    - One alternative would be fusing our features into a more monolithic extension that does it all at once. The pro of this is it could avoid duplicated code for similar features, however, given how distinct our features our having them be separated will keep changes clean a bug in one will not bring down the others.
    - Another alternative would be to make each part a wholly separate extension instead of having separate parts of the extensions. This would have the benefits of further separating any change of failure affecting other parts of the system, however, it would come with the drawback of being harder to install and test. Most of our features cohere and so should exist together.



- PlantUML of Extension Architecture

2. Software design

Provide a detailed definition of each of the software components you identified above.

- What **packages, classes, or other units of abstraction** form these components?
    - Each feature will be contained in its own separate package and will implement functions internally. We will likely not use classes because they are antithetical to the styling of chrome extensions and JavaScript. We will use the Chrome extension listener abstraction to run most of the code.
- What are the **responsibilities** of each of those parts of a component?
    - Each package as mentioned will totally handle one feature of the extension and in that we will use the built-in Chrome extension abstractions such as listeners to run our functions when necessary.

3. Coding guideline

For each programming language that you will use in the implementation of your project, provide a link to a pre-existing coding style guideline that the members of your project will follow. Do not try to make up your own guidelines. Briefly state why you chose those guidelines and how you plan to enforce them.

- **Classes**: Pascal, **Everything else**: Snake case
- /* Comment every function */
    - What to Include:
        - Input: Parameters taken in by the function
        - Output: Result the function

        - Function description: What the function does and how it works.
- Keep features separated in files for only said specific feature