GraduAid

CS194 Project Proposal

Team Nogada

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Abstract

Stanford students have to juggle multiple tools such as Axess, Explore Courses, Excel 4-Year Plans, and Program Sheets in order to fully plan out their graduation requirements. For our project, we consolidate the different resources into a single platform for easy tracking and updating of the degree progress, allowing users of GraduAid to not only avoid unnecessary confusion, but also save time in creating their ideal 4-year plans.

Description of the Project

GraduAid is a web application that helps Stanford students keep track of which graduation and major requirements they have fulfilled, identify ones they need to take within their specific concentration and discover potential courses they could take to meet the requirements. Graduation requirements are very different for each major and concentration, so we will focus on the Engineering undergraduate degrees first, and then gradually extend to other majors.

GraduAid has a multi-step sign-up process that begins with creating a profile with basic information such as name, graduation date and major. Next, they choose the details of their degree, such as concentration (i.e. Human Computer Interaction, Systems, Artificial Intelligence). The final step is filling in all the classes they have already taken within different areas such as core, depth and electives. To make the process easy, writing down all the courses will most likely be in multiple choice form depending on the track they choose.

Once all the information is recorded, students can use various functions to plan their quarter schedules:

- See what requirements they are missing and how many more units they need within core, depth and electives
- Check how much progress they have made overall
- Show a list of classes that you could take to fulfill the missing requirements
- Check your major GPA and cumulative GPA

Overall, our aim with GraduAid is to provide a platform for easily tracking of numerous graduation requirements and planning for optimal future quarters.

Need for the Product

Many requirements need to be fulfilled in order to graduate from Stanford University. There are two main categories: the general undergraduate requirements and specific major requirements. Axess shows the degree progress report, but it is very limited since it only shows the progress on the general requirements and not the major requirements. To check upon the full degree progress including the core major classes and electives, students must manually go through the program sheets provided by each department, handwrite the plans for the classes, and constantly go back and forth to Stanford Explore Courses to read the class description and decide whether to take the class or not. For a university renowned for the talented computer science skills, having to repeatedly go through Excel sheets is surprising.

Students need a better platform to see how far they are into graduation, and what more they need to fulfill. Currently, the resources are scattered across Axess, Explore Courses, Stanford Undergraduate Handbook, and Excel program sheets. After declaring a major, students are given the option to choose from numerous tracks to focus their studies, but the different track requirements can be confusing. If students take major classes without a specific track in mind, and later on want to find out what track fit them the most, the only option they currently have is to go through the entire program sheet for the major and one-by-one create a manual checklist to see how far they are into each track. If they take more classes later on, they would have to go through the entire process again. Stanford students need an automated platform that can keep this list up-to-date and show the degree progress for all possible tracks so students can better decide which track to focus on.

The current system is limited in showing how students are performing academically. We have the access to our transcripts, but they only show the current quarter and the overall GPA. To get the major GPA, students must match their past previous classes in the program sheets and calculate the GPA with the corresponding unit counts. This project will save students time and efforts to track their progress.

Potential Audience

We have performed a small survey by asking Stanford undergraduate students what they thought about our project. Everyone responded positively, and strongly encouraged us to pursue with the project. They all shared common difficulties of going back and forth on Axess, Explore Courses, and Excel program sheets. They want a single, unified platform that provided these services. When our product goes live, we expect all of the undergraduates majoring in Engineering, or anyone who wants to see how far they have progressed in a specific track in Engineering, but do not have the time or resources to do the work themselves, to be eager to use this product. Stanford University does not have a platform that provides a concrete, complete degree progress analysis for each track. As this platform would provide such analysis not only for a single track, but also for all tracks to easily compare, our team expects all of the Engineering majors to find value in using this product.

In addition to this, we expect the undeclared freshmen and sophomores considering Engineering as a potential major to be willing to use the project. Since they are new to Stanford and have a lot to learn and be accustomed, it is difficult for them to plan their future academic quarters without a unified platform that provides clear guidelines and goals that are needed to pursue a track in Engineering. This product could reduce much of the workload and pressure off of their shoulders. Therefore, we expect this product to be widespread not only amongst the students majoring in Engineering, but also the undeclared freshmen, sophomores, and prospective Engineering majors.

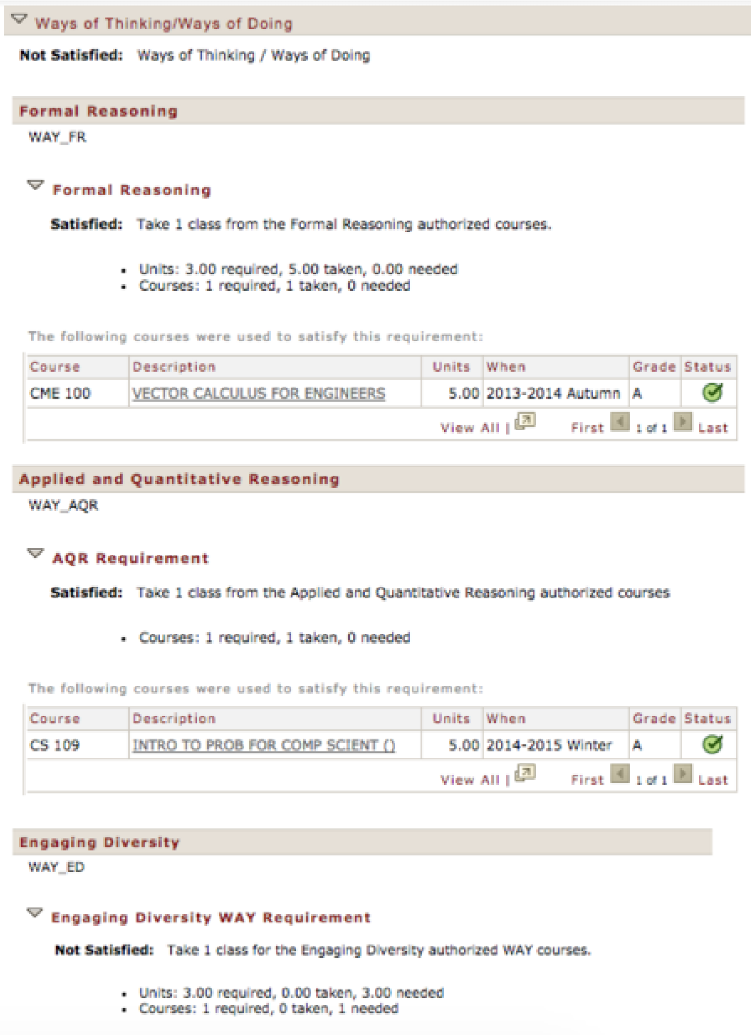
Should our project expand to cover all majors provided to Stanford undergraduates, our team expects the potential users to be the entire Stanford undergraduate community. From our surveys, we found out that a number of undergraduate students at Stanford are already experiencing stress by the lack of the unified platform to gauge their degree progress. If this project can expand beyond the scope of Engineering majors, then we expect the potential audience to be the entire Stanford undergraduate.

In terms of technical sophistication, Stanford students are very proficient in using technology. As people in the heart of silicon valley who are exposed to the numerous and ever-changing technologies, we find that our audience will not have much trouble interacting with our product as long as the workflow of our website mirrors the structure of the popular websites.

Discussion of Competing Products

When it comes to class selection and course scheduling for major requirements, most Stanford students rely on creating their own Excel spreadsheets and painstakingly looking through Explore Courses course descriptions and their major spreadsheet. There is no product or a platform that integrates the major requirements and the current progress of an individual student.

As mentioned before, Axess provides a Department Degree Progress Report that checks whether a student has fulfilled each general requirement. However, as *Figure 1* shows, this report is only limited to monitoring the general requirements that every undergraduate student at Stanford needs to fulfill, without any respect to individual major requirements. Furthermore, the report does not provide any recommendations of classes to fulfill the requirements he or she is lacking, forcing the student to search for classes on their own.



Ways of Thinking/Ways of Doing

Not Satisfied: Ways of Thinking / Ways of Doing

Formal Reasoning

WAY_FR

Formal Reasoning

Satisfied: Take 1 class from the Formal Reasoning authorized courses.

- Units: 3.00 required, 5.00 taken, 0.00 needed
- Courses: 1 required, 1 taken, 0 needed

The following courses were used to satisfy this requirement:

Course	Description	Units	When	Grade	Status
CME 100	VECTOR CALCULUS FOR ENGINEERS	5.00	2013-2014 Autumn	A	✓

Applied and Quantitative Reasoning

WAY_AQR

AQR Requirement

Satisfied: Take 1 class from the Applied and Quantitative Reasoning authorized courses

- Courses: 1 required, 1 taken, 0 needed

The following courses were used to satisfy this requirement:

Course	Description	Units	When	Grade	Status
CS 109	INTRO TO PROB FOR COMP SCIENT ()	5.00	2014-2015 Winter	A	✓

Engaging Diversity

WAY_ED

Engaging Diversity WAY Requirement

Not Satisfied: Take 1 class for the Engaging Diversity authorized WAY courses.

- Units: 3.00 required, 0.00 taken, 3.00 needed
- Courses: 1 required, 0 taken, 1 needed

Figure 1: Axess Degree Progress Report of a current student

Additionally, numerous websites for Stanford students provide course descriptions, real student reviews, and cumulative grade distribution. These websites, including CourseCycle, Edusalsa, and TreeViews have the same focus - they concentrate on providing information of each class. However, GraduAid focuses on exploring different majors rather than individual classes. We plan to concentrate on creating a bigger picture and leading each student to examine diverse majors given classes he or she has taken so far.

Major Technologies Used

Below is a list of major technologies we will use to build our web application:

- Web server: Since we are building a web application, we definitely need a web server to run our application. Currently we are planning to use Amazon AWS.
- Programming language: We will develop a web application, so we will mainly use HTML, CSS, and JavaScript to render web pages for clients. For server-side, we will deploy Node.js as our main framework, so JavaScript will be our main programming language.
- Database: Currently, we are thinking of integrating our database into the main web server as we expect that there will be relatively small amounts of data to be stored in the database. However, it is possible that we may need a separate database server if the total amount of data becomes larger. In this case, we plan to use open sources like Amazon AWS.
- Development framework: Node.js is our main framework. More specifically, advanced frameworks optimized for web applications will be deployed, such as AngularJS and ExpressJS, which are built top of Node.js.
- Version control systems: We will use GitHub and integrate SourceTree with it. GitHub is a widely utilized version control system, and SourceTree provides GUI and easy interface to use.
- Course information API: We need to fetch information of all courses for our project, and thankfully, there exists an open API to access the course database, provided by Jim Sproch. (http://explorecourses.stanford.edu/instructor/jsproch)

Resource Requirements

There are main resource requirements:

- A web server to run our application
- Permission from the owner of the course data API.

Potential Approaches

The main goal of GraduAid is to provide students with a unified online platform to track their academic degree progress. Among many options provided, we decided on an online web platform after we analyzed the pros and cons of different platforms and methods.

Our team favored the web platform over the mobile platform because when students plan their future courses, they normally do so with multiple tabs and online resources open on their computer screens. They need to look at many documents, such as their transcripts, Excel sheet, and their previous plans that require their working in a screen bigger than their hand-held mobile phones. Also, students will have to input different classes they have taken so far, so web platform will be more convenient than a mobile platform.

There may be other possible approaches to this problem, such as hosting info sessions to inform students about different tracks available, distributing a simpler Stanford Undergraduate Handbook to all undergraduates, or leaving it up to the freedom of students to use Excel program sheets. However, our team believes providing an online platform is the most appropriate answer to the problem, because students are given too much information that is up to them to organize and digest. To organize their time and resources more efficiently, students should be given a choice to use the online platform without time or location restriction, which is difficult to achieve using info sessions, handbooks, and program sheets.

In terms of design, we looked at similar websites such as EduSalsa, CourseCycle, and also very unrelated websites such as Pinterest and AirBnB for inspiration. EduSalsa and CourseCycle have a relatively intuitive interface for search, so we could take a similar approach in listing potential courses. Pinterest's "categories" function can be adopted to a "choose your majors" option, and AirBnB has a good filtering UI which is useful to have. Another application that we can take inspiration from is Slack. Slack has a main screen with sidebars with different options. Similarly, GraduAid could have a main screen with different displays depending on what option (or what "channel") the student chooses on the sidebar.

Also, after much consideration our team decided to remove the recommendation functionality from our product. We had planned to provide a list of recommended courses based on the previous courses taken, but we fear this might restrict students' will to take courses they are interested in favor for those that are merely more popular. We want this product to be used to provide a clearer guideline for students to seek for themselves, not for them to follow others' footsteps. Therefore, our team's product will focus on providing a comprehensive up-to-date degree progress for different tracks under Engineering major, but not the recommended courses to take in the future.

Assessment of Risks

There are potential risks we may face while working on our project:

- Risks regarding resources:
  - One major risk is that we need permission to access the course data API, and we are still waiting on a response from the owner. If we do not get a response, we will first build our entire website using hard-coded data, and then work with the CS department to find an alternative.
- Risks on user behavior:
  - Limiting students' scope of exploration: By providing which courses to take in order to fulfill graduation requirement, GraduAid risks inhibiting students from exploring more courses and encouraging students to only focus on taking major-related courses. However, we plan to only provide suggestions based on the objective facts - courses that need to be taken based on the courses a student has taken so far in order to pursue a selected major, rather than recommending what classes are good to take.
  - Having to frequently update their coursework information: In order for the functionalities on the website to work correctly, the user has to be diligent about updating his information regarding the most recent courses he took. If the user finds this process to be difficult or annoying in any way, GraduAid will lose its appeal. This is an important risk, which is why we will carefully design the workflow of the website to minimize different pain-points of manual update, such as using multiple choices rather than fill-ins and making the UI very clear on what the input has to be.

Next Steps

In order to build our product, we have identified some next steps:

Week 2 - 3

- Set up the basic web server and integrate version control system into it.
- Install development framework on the web server.
- Design and implement the basic data structures of application. (e.g. user, course, track)

Week 4

- Fetch data from course API and import some sample program sheets to test and improve interfaces developed until this point.
- Test and improve the interface and design flow chart of the application.

Week 5 - 6

- Design and implement each web page to clearly display information to clients.

Week 7 - 8

- Complete the application by adding specific features such as a log-in system.