GradMap

“Your Roadmap to Graduation Success”

Team Ruby

CS-410 Fall 2025

Team Bio


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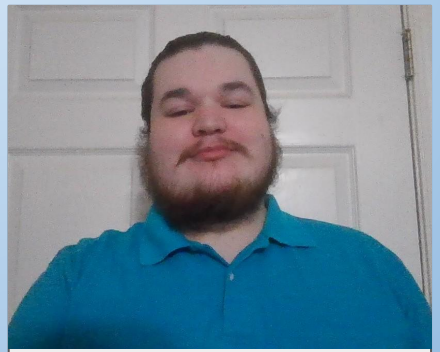

Matthew Haydon - Designing Lead

The Background

- **Why is this domain important?**

  Students can often have an issue with not being able to register for the classes they need wich can delay graduation and increase costs.
- **What are the current misconceptions or gaps?**

  Current tools like DegreeWorks do not really work well with handling personal time conflicts.
- **Define key terms.**

  Conflict-free scheduling: Ensuring no overlapping courses within a plan

  Constraints blocks: Reserved personal or work time where classes cannot be scheduled.
- **Who is struggling?**

  Students and advisors spend hours trying to align students schedules.
- **Why are existing options insufficient?**

  Current options are outdated, confusing, and do not combine degree rules with current course data due to the lack of the good use of scribing which is how you code program requirements that the system can logically understand.
- **Show the cost of inaction.**

  If this problem is ignored students can waste time, spend more money, take longer to graduate, or even drop out.

The Problem

Problem statement: Our project addresses the challenges of students facing graduation delays due to issues with overlapping class schedules with personal commitments, lack of real-time registration integrations, and limited advisor support tools.

Who is Affected:

- Students cannot register for required classes, can face delay by not being able to complete the necessary credits to graduate, stress, and extra tuition cost.
- Advisors spend hours manually checking prerequisites and student time conflicts.
- As a result of insufficient class registration systems, universities can have lower graduation rates due to people being not being able to complete classes. And advisers spend more time trying to look for accommodation for student schedules.

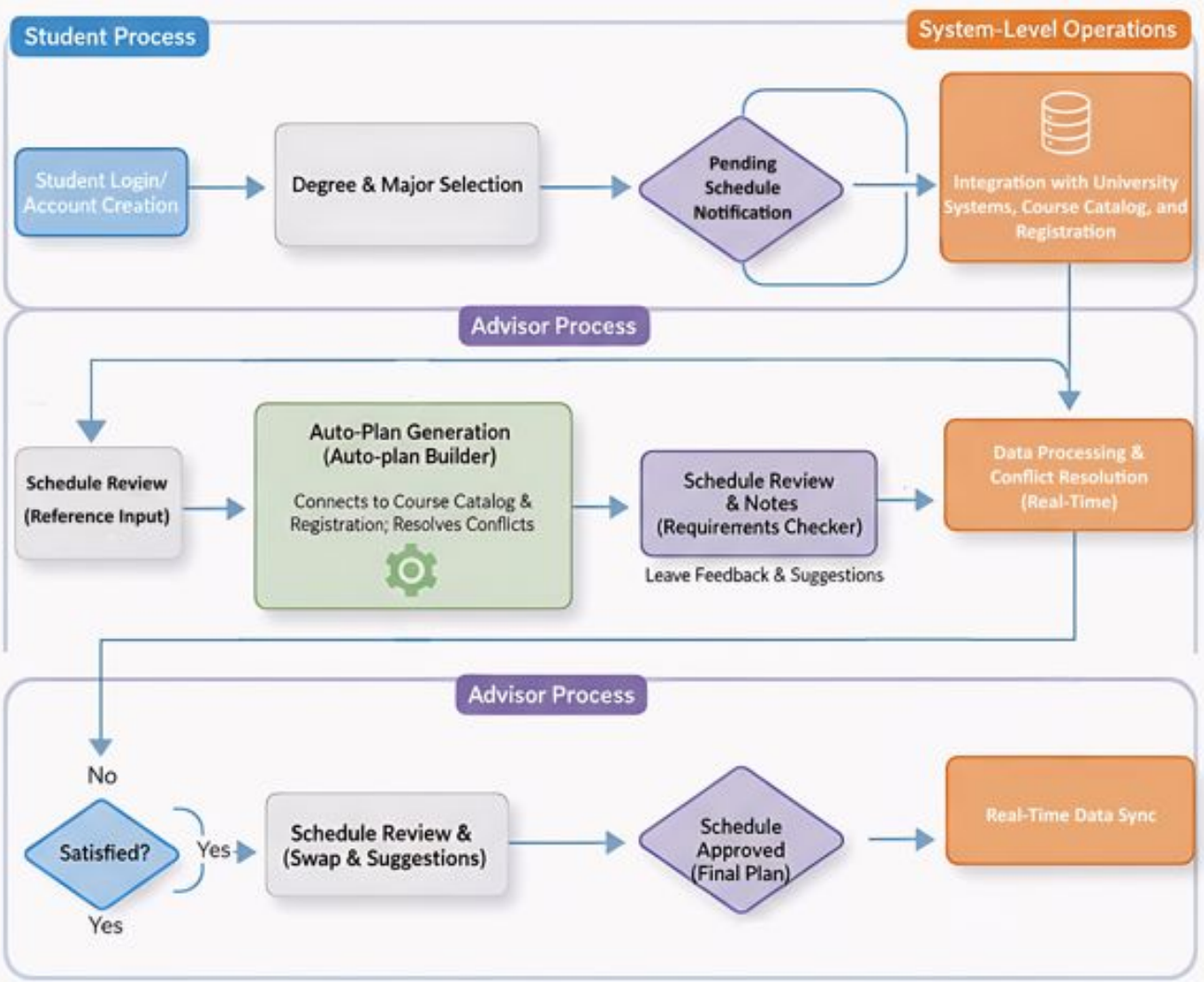
The Problem Characteristics

- Human Limitations/Error: An overload of information can be difficult for people to process properly, thus leading to difficulties forming a new class schedule. Additionally, people may simply forget valuable information that should affect their scheduling.

- Schedule Balancing: Properly balancing school, work, and personal life can be an arduous task that requires great scrutiny to properly complete.

- Site Navigation: Coursework scheduling sites are oftentimes difficult to navigate properly, with a lacking UI.

The Current Process Flow Diagram



The Solution

- Our solution is Gradmap, a web application that helps college students and advisors create seamless, conflict-free, and degree compliant schedules in a matter of minutes.

- Gradmap auto-builds personalized class plans based off individual student's degree requirements, availability and preferences. It then submits a reviewer rough draft for approval by the advisor.

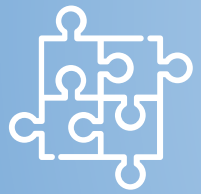
- Gradmap serves primarily undergraduate and graduate students as primary users. The secondary users are academic advisors and program directors.

- Unlike current traditional competitors such as Degreeworks, Gradmap combines degree requirements, course availability, personal preferences/constraints, and advisor collaboration into one complete platform. It's real-time smart suggestions and conflict alerts set it apart from the competition. This is truly a graduation success platform that keeps students on track and eliminates registration headaches.

Solution Characteristics

Problem Characteristic: Human Limitation/Error

Solution Characteristic: **Automated smart scheduling and conflict detection** - GradMap processes requirements, availability, and preferences that reduce cognitive load



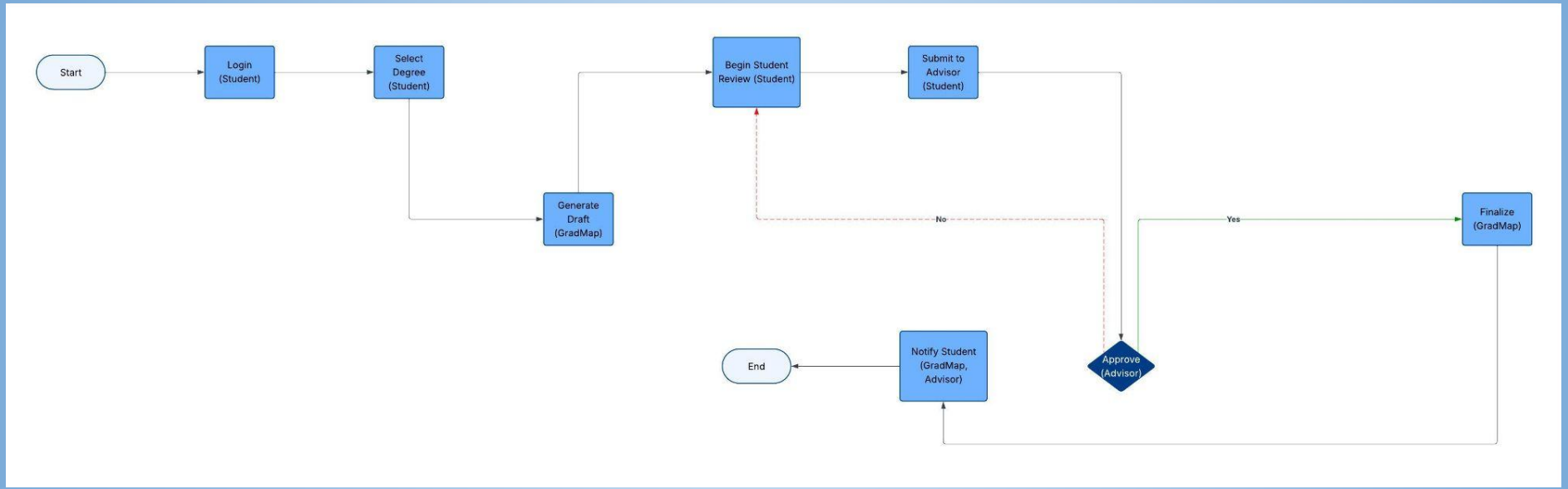
Problem Characteristic: Schedule Balancing

Solution Characteristic: **Load-balancing recommendations** - Suggests optimal course combinations to avoid burnout

Problem Characteristic: Site Navigation

Solution Characteristic: **Streamlined workflow** - Step-by-step guided scheduling process

Solution Characteristic Flow Chart



Competition Matrix

Features	GradMap	Degreeworks	Internal University Registration Systems
Automated Smart Scheduling			
Conflict Detection		✔	✔
Load-Balancing Recommendations			
Streamlined Workflow		✔	
Constraint Blocks for Students			✔
Advisor Review		✔	✔
Requirements Checker		✔	✔

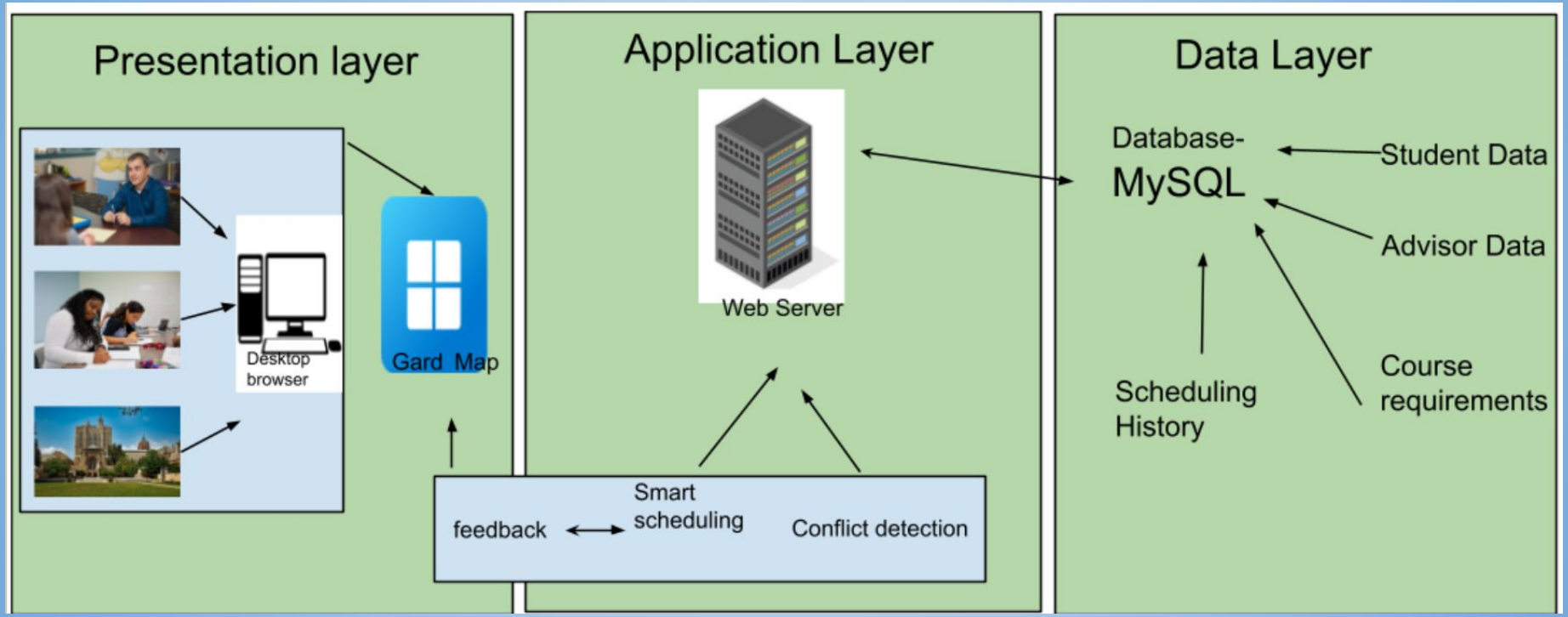
DegreeWorks - (South Texas College)

Internal Systems - (Coursedog)

Major Functional Components

- Operating System - Cross platform(windows, macOS, linux) Our system will work on any OS where the web server and database are supported.
- Web Server - Apache, Nginx, or Microsoft IIS
- Database - MySQL will store schedules, requirements, and user data..
- Server Side Language - Java

Major Functional Components Diagram



Development Tools

- **Integrated Development Environment (IDE)** - VSCode
- **Version Control** - Git through GitHub
- **Continuous Integration (CI) and Continuous Deployment (CD)** - GitHub Actions and GitHub Workflows all through GitHub

What It Will Do

Functionality

- GrapMap is a web application that automatically build personalized class schedules for students that will do the following:
  - Individual degree requirements
  - Course availability
  - Personal preferences
  - Generates a draft plan that is shared with advisors for review and approval

What It Will Do (cont.)

Automated Smart Scheduling

- Instantly generates personalized class schedule that will just take moments for students and even the advisors
- Accounts for degree requirements, prerequisites, and course availability which all impact student course scheduling
- Integrates student preferences and time constraints that allow for the student to have a say of what their schedule looks like
- Provides real-time conflict detection and alerts

What It Will Do (cont.)

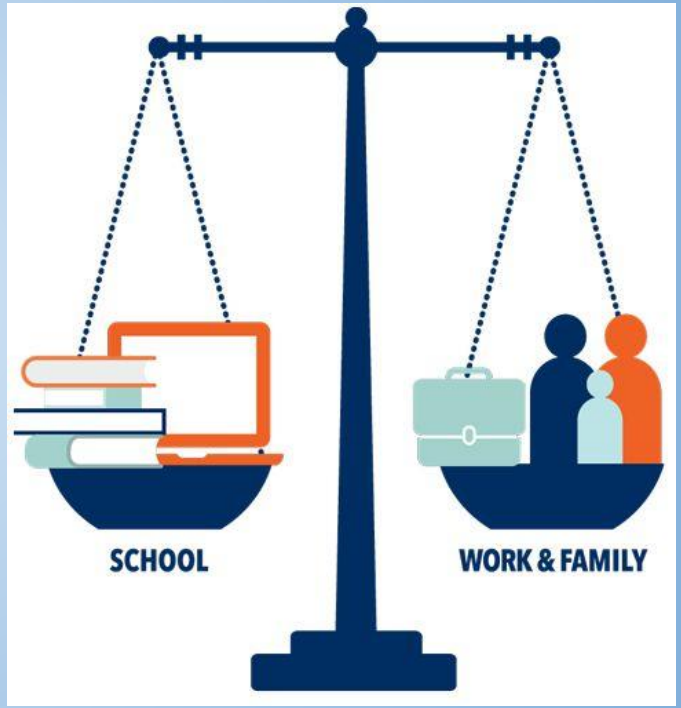
Conflict Detection

- Identifies time conflicts between courses instantly
- Flags any degree requirement gaps to present delays in graduation which will save time and money
- Alerts users of overlapping prerequisites or corequisites
- Detects course credit overloads and underloads if applicable
- Ensures that every schedule will remain degree complaints and will be on track for you to graduate on time

What It Will Do (cont.)

Load-Balancing Recommendations:

- Recommend a student to take less courses if they choose multiple
- Recommend taking classes before or after others to help further student education
- Try to recommend courses if not a lot of them have been chosen
- Factor in student availabilities

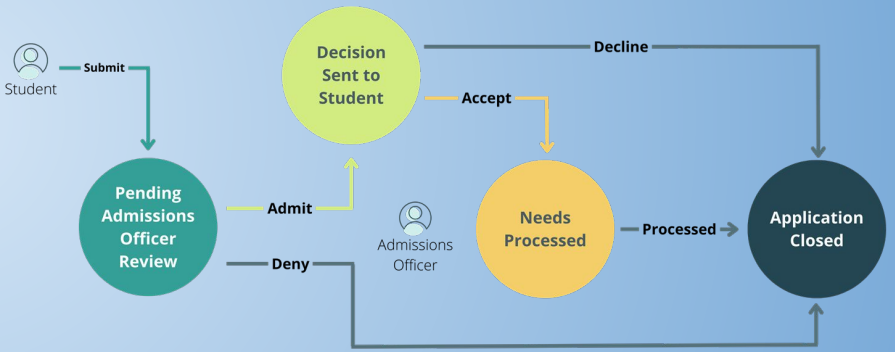


(Pinterest)

What It Will Do (cont.)

Streamlined Workflow:

- Suggest courses that should come next as the student works towards their desired degree
- Suggest valid electives that will work towards the degree
- Keep track of past courses



(CognitoForms)

What It Will Do (cont.)

Constraint Blocks for Students

- GradMap will be personalized for each student, and for constraints that conflict with necessary class scheduling, it will compile a list of recommended actions to take in the case of an unavoidable time conflict.
- If the conflict cannot be resolved, it will compile a list of recommended substitute classes, or if the class is a necessary prerequisite, then it will inform the student that their schedule needs to change immediately.

What It Will Do (cont.)

Advisor Review

- The program will combine all of the User's preferences and availability into a schedule to be sent to their advisor for review.
- The advisor can navigate to the schedule and click to approve or reject the prototype schedule.
- In the case of a rejection, the advisor must put in additional information as to what is wrong with the schedule and suggestions to amend it.

What It Will Do (cont.)

Requirements Checker:

- Degree Requirement Validation
- Real-Time Feedback
- Progress Tracking
- Error Prevention
- Advisor Collaboration Support

What It Will NOT Do

Automated Registration

We will generate conflict-free schedules, but actual enrollment will still be handled through the university's official registration system for security and policy reasons.

Financial Aid / Billing

These functions involve sensitive financial data outside the scope of course scheduling.

Major/Program Changes

Students must still meet with advisors to formally switch majors or degree plans. We will only display degree progress for the current program.

Risk Matrix

	Insignificant	Minimal	Moderate	Major	Critical
Certain					
Likely				Lack of Training and Support High Server Load	
Possible		Copyright Infringement	Integration with School Systems Conflict Detection Error		Data Breach
Unlikely				Unreliable Data Storage	Inaccurate Advice
Rare					

Customer & End User

Inaccurate Advice:

- Risk:
  - Advice is given to a student causing (Searcy):
    - Conflicts of Interest
    - False Degree Paths
- Probability:
  - 2 out of 5
- Impact:
  - 5 out of 5

Inaccurate Advice:

- Mitigation:
  - Design a filter that blocks out certain courses from being advised based on:
    - Student's History
    - Student's Degree Path
    - Student's Time Constraints
  - This will keep the system from providing any false suggestions and keep a student from choosing to take incorrect courses

Customer & End User (cont.)

Lack of Training and Support:

- Risk:
  - A student is unable to ask questions about courses and receive reliable responses causing (Searcy):
    - Unwanted Stress on the Student
    - Miscommunication with the Student
    - Misunderstanding with the Student
- Probability:
  - 4 out of 5
- Impact:
  - 4 out of 5

Lack of Training and Support:

- Mitigation:
  - Implement a training and support system:
    - Training the System on Frequently Asked Questions
    - Providing Ways to Contact Human Advisors for Help
  - This will grant students ways to get help and understand something they have questions about

Technical

Risk ID	Description	Impact	Probability	Mitigation
T1	Integration with existing college systems such as Degreeworks may fail or produce inconsistent data due to incompatibilities.	Major, 3/5	Possible, 3/5	Take care of this with early testing of sample university data, create robust API and failure handling API.
T2	High server load may lead to slow performance during peak registration times, affecting the stability of our application.	Critical, 4/5	Likely, 4/5	Implement cloud infrastructure, use load balancing, and perform alot of testing under simulated peak times.
T3	Errors in schedule conflict detection could generate inaccurate results for students. This could cause user mistrust in the app.	Major, 3/5	Possible, 3/5	Use unit testing with known conflicts or issues. Review with advisors and student feedback to ensure errors are being detected and handled correctly.

Security

Data Breach/ Unauthorized Access

- Sensitive student and advisor data such as scheduling information, degree progress, and personal university information could be exposed due to poor access control.
- Probability:3/5
- Impact: 5/5
- Mitigation:
  - Use encrypted connections like HTTPS or SSl and database encryption to prevent easy bata breaches
  - Potentially have regular security audits and testing that looks for any sort of data or access breaches

Security (cont.)

Unreliable Data Storage

- Data could be intercepted or leaked if transmitted or stored without proper encryption
- Probability: 2/5
- Impact: 4/5
- Mitigation:
  - Use secure APIs and token-based authentications
  - Update dependencies to patch vulnerabilities

Legal

Copyright Infringement

- Application could be seen as too similar to competitors, and used information can only be legally obtained.
- Probability: 3/5
- Impact: 2/5
- Mitigation:
  - Ensure layout and logo do not conflict with other competitors
  - Only use publicly available information and user inputted queries.

References

CognitoForms. *CognitoForms*, https://static.cognitoforms.com/content/support/assets/images/basicadmissionsapplicationworkflow-0f52033c-6cfe-42af-84b7-f27227f9aa36-dc49634-1500x650.png. Accessed 29 Sept. 2025.

Coursedog. "Academic Scheduling Software." *Coursedog*, www.coursedog.com/ppc/d-scheduling---1cta?utm_source=bing&utm_medium=cpc&utm_campaign=NA%2BNonBranded%2BBing&utm_agid=1349103273937169&utm_term=university+scheduling+software&matchtype=p&creative=&device=c&placement=&msclkid=150f2b848aa2174d9b70435e5422ac86. Accessed 29 Sept. 2025.

"Common Issues with Degree Works Audits (and How to Fix Them)." *David Kent Consulting*, 26 Sept. 2025, davidkentconsulting.com/blog/common-issues-with-degree-works-audits-explained/. Accessed 06 Oct. 2025.

Lucid Visual Collaboration Suite: Log In, lucid.app/lucidchart/74262593-0fe2-4270-ab6b-53907305ee63/edit?viewport_loc=-2489%2C605%2C3361%2C2295%2C0_0&invitationId=inv_68ec5ed1-5618-4b56-8f10-59f3cad97e0b. Accessed 15 Oct. 2025.

Pinterest. *Pinterest*, https://i.pinimg.com/736x/78/fa/54/78fa5434fc6f7382d1618cf906996885--graduate-school-school-life.jpg. Accessed 29 Sept. 2025.

Searcy, Lucy. "Embracing Technology in Academic Advising: A Vantage Point from 14 Years in Higher Education." *NACADA The Global Community for Academic Advising*, 15 June 2025, nacada.ksu.edu/Resources/Academic-Advising-Today/View-Articles/Embracing-Technology-in-Academic-Advising-A-Vantage-Point-from-14-Years-in-Higher-Education.aspx.

South Texas College. "DegreeWorks FAQ." *South Texas College*, studentservices.southtexascollege.edu/advising/degreeworks/faq.html. Accessed 28 Sept. 2025.