INFO 698: Analyzing Graduate Admissions Trends

Project Proposal & Statement of Work

Tavia Szostek (**Project Manager**, Graduate Enrollment and Retention): As the manager of graduate enrollment and retention, Tavia Szostek leads and manages college graduate student admissions, recruitment, and retention initiatives. Her role is focused on developing and implementing effective strategies, programs, and processes to attract, enroll, and support graduate students throughout their academic journey.

Anushree Biswas: Data enthusiast with a background in Environmental Engineering and industry experience as a Data Scientist, currently pursuing a master's in information science at the University of Arizona—passionate about statistics, Python, data pipelines, and cloud technologies.

Panneer Selvam Mani Sekaran: Computer Science graduate with experience in automation, DevOps, Terraform, and cloud engineering—skilled in Python, VBScript, and R, with a strong interest in data analysis and visualization.

Naitik Shah: Master's student in data science at the University of Arizona with a passion for predictive analytics, GIS visualizations, and data-driven solutions in traffic safety, e-commerce, and healthcare.

Ajay Sreekumar: Software engineer with experience in ML/AI research, specializing in LLMs and ontologies, skilled in Python, SQL, NoSQL, and BI tools—driven to uncover insights from complex data.

POTENTIAL ADVISORS:

Tavia Szostek: Manager of Graduate Enrollment and Retention, leading admissions, recruitment, and support strategies to enhance the graduate student experience.

Eric Gonzales (Graduate Admissions Lead), Holly Brown (Director of Graduate Programs), Cristian Román-Palacios (Assistant Professor and Advisor for MSDS/MSIS)

Date: April, 02nd 2025

Revision History Table		Template Date 4/2/2025
Version	Summary of Changes	Date
V1.0	*Creating first version of Proposal document with basic sectional information*	*4/2/25*

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Executive Summary

The Executive Summary was written by Ajay S.

Our project is a comprehensive data analytics solution that transforms raw graduate admissions data into actionable insights through advanced statistical analysis and interactive visualizations. The system processes historical admissions records to identify key trends in applicant demographics, acceptance rates, and enrollment patterns while providing predictive modeling capabilities to forecast future admissions cycles accurately.

Graduate admissions departments face significant challenges in optimizing their recruitment and selection processes. According to the Council of Graduate Schools, U.S. graduate applications increased by 7.3% in 2023, yet institutions struggle to target their recruitment efforts and predict enrollment yields[1] effectively. Our solution addresses these pain points by providing a data-driven approach to understanding admission patterns, identifying influential factors in student decisions, and forecasting admission outcomes. This enables administrators to make more informed strategic decisions regarding resource allocation and recruitment targeting.

We will develop this system through a multi-phase approach, beginning with data collection and cleaning from university databases and then implementing initial SQL and Python analyses. Our team will create statistical models to identify significant admissions factors and develop interactive visualization dashboards using Tableau or Power BI. Team members will collaborate in a hybrid environment, with weekly in-person meetings supplemented by virtual collaboration tools. By the end of the semester, we will deliver an admissions pipeline, analytical models, and an interactive dashboard with documented insights and recommendations for optimizing the admissions process.

Table 1 shows the preliminary division of responsibilities among the team members. Each team member brings specialized expertise to address the complex requirements of the data engineering infrastructure and the analytical components.

Team Member	System Analysed
Ajay Sreekumar	GradApp System Analysis
Naitik Shah	UAccess Analytics Analysis
Anushree Biswas	UAccess Analytics Analysis
Panneer Selvam Mani Sekaran	GradSlate System Analysis

[1]Council of Graduate Schools, Graduate Enrollment and Degrees Report, 2023

Market Research

The section was written by Anushree Biswas.

The University of Arizona's College of Information Science (InfoSci), formerly the School of Information, is a rapidly growing and evolving academic hub that embraces innovation and excellence across the information sciences. As the college expands, attracting and supporting talented graduate students has become increasingly critical to enhancing its recognition and impact.

Currently, the admissions team uses three main tools: Grad Slate (a CRM for managing prospective student leads), Grad App (the graduate admissions platform for application management and review), and UAccess Analytics (an internal reporting hub offering access to detailed dashboards and data). While these tools provide valuable information, much of the data is exported into spreadsheets, making it challenging for the admissions team to derive actionable insights efficiently.

A centralized visualization dashboard is strongly needed to support strategic decision-making better. Such a dashboard would streamline data interpretation, improve applicant tracking, and enhance department communication. By visualizing trends and key metrics, the team can more effectively identify high-potential applicants and regions.

Additionally, the college seeks to identify countries with a high concentration of talented students to develop strategic global partnerships. These collaborations could further position InfoSci as a leader in international education and research while expanding its reach and diversity. Investing in data-driven strategies will support recruitment goals and reinforce the college's mission to lead in information science.

Project Deliverables

The section was written by Anushree Biswas.

This project aims to develop interactive dashboards that empower the admissions team to make data-driven decisions. The dashboards will be built using data from three core systems: Grade Slate, Grad App (representing the first step of a student's journey), and UAnalytics (for more profound insights).

Understanding Admission Patterns:
The dashboards will analyze trends in applicant volume, acceptance rates, and enrollment numbers over time. Key factors influencing admissions—such as GPA, undergraduate coursework, and geographic location—will be examined to identify strong predictors of student success. Additionally, the dashboards will highlight demographic shifts in the applicant pool, such as age ranges, regional representation, and citizenship changes.

Improving Recruitment and Admissions Strategies:
Yield rates (percentage of admitted students who enroll) will be analyzed to optimize outreach and marketing efforts. The dashboards will explore factors influencing student enrollment decisions, helping the institution tailor communication strategies. Forecasting tools will be incorporated to model the impact of changes in admission criteria on overall enrollment and institutional capacity.
Top Areas of Interest for the Admissions Team:

- Applicant Age Ranges
- Regional/Location Breakdown
- Bachelor's Degree Institutions
- Number of Applications Per Week/Month
- Average Applicant GPA
- Time to Degree for Undergraduate Education (using start and end dates from Grad App)

These dashboards from the three apps will provide actionable insights, enabling the admissions team to refine strategies, enhance student targeting, and make more informed enrollment decisions.

What Analysis Is Being Run?

This section was written by Panneer S.

This project analyzes graduate college admissions data to extract insights, identify trends, and support data-driven decision-making. By leveraging statistical methods and visualization tools, we will explore various dimensions of the admissions process. The analysis will encompass the following key components:

- **Descriptive Statistics and Data Visualization:** We will start by computing descriptive statistics to provide a foundational understanding of the dataset. To make the data more accessible, we will employ visualization techniques: visualizations will illustrate the data trends, bar charts will compare categorical data (e.g., acceptance by program), and more.
- **Trend Analysis:** We will analyze historical data time series to understand how admissions patterns evolve. This will involve tracking changes in application volumes, acceptance rates, and applicant demographics over multiple years. Line graphs will be plotted to highlight these trends, enabling us to identify seasonal patterns, long-term shifts, or anomalies that warrant further investigation.
- **Geospatial Analysis:** Finally, we will explore the geographical distribution of applicants and accepted students using geospatial visualization. Visualization will depict acceptance rates by region, revealing geographic trends or gaps that could guide targeted outreach efforts. This component will leverage mapping tools to ensure accurate and visually compelling representations.

By integrating these analytical methods, we will comprehensively examine graduate college admissions. This approach will yield insights that are both broad in scope and detailed in execution, supporting the admissions team's strategic planning and visualization.

What Accuracy Is Expected?

This section was written by Panneer S.

Ensuring the accuracy of our analysis is critical to delivering reliable, trustworthy results that stakeholders can confidently use to inform graduate college admissions strategies. Each analytical component has specific accuracy targets and validation methods, outlined below, to guarantee high-quality outcomes.

- **Descriptive Statistics and Data Visualization:** Accuracy here centers on the correctness of statistical calculations and the reliability of visualizations. To ensure integrity, we will preprocess the data precisely—removing outliers, correcting errors, and handling missing values—and cross-check visualizations against raw data to confirm they accurately reflect computed statistics, minimizing misrepresentation.
- **Trend Analysis:** The accuracy of trend analysis will be measured by how well trend lines fit the historical data.
- **Geospatial Analysis:** The accuracy of geospatial visualizations relies on precise geographical data and correct mapping. We will validate these outputs by cross-referencing with known regional statistics and ensuring proper alignment of data points on maps. Any discrepancies will be corrected to maintain visual and analytical accuracy.

To support overall accuracy, we will implement several best practices:
- **Data Validation:** We will verify the quality and recency of data sources, ensuring they are authoritative and error-free.
- **Expert Oversight:** Subject matter experts will review findings to validate their plausibility and relevance.

By adhering to these standards, we expect our analysis to deliver highly accurate results—quantitative predictions with strong statistical backing and qualitative insights grounded in reliable methods. This level of precision will empower the admissions team with confidence in the project's outcomes, facilitating effective decision-making in graduate college admissions.

What if the Analysis doesn't run?

If the analysis does not proceed as expected, the following options will be considered:

1. **Technical or Tool-related Failures**
   If issues arise with the analysis tools or scripts:
   - Break the workflow into smaller steps to identify and resolve errors.
   - Alternative tools or platforms (e.g., Excel, Google Sheets, Tableau) can be used to perform fundamental analysis and visualizations.
   - Maintain version control to recover from unexpected failures.
   - Leverage cloud platforms if local resources are insufficient.
2. **Lack of Meaningful Trends**
   If the data does not reveal strong or clear patterns:
   - Focus on descriptive statistics and exploratory insights.
   - Identify possible reasons for the lack of trends.
   - Highlight anomalies, data gaps, or potential areas for further research.
   - Suggest improvements or additional data that could enhance the analysis.
3. **Time or Resource Constraints**
   - Prioritize the most critical research questions (e.g., trends in application and acceptance rates).
   - Present preliminary findings with suggestions for further analysis in future phases.

By planning for these possibilities, we aim to ensure that the project remains valuable and informative despite unexpected challenges.

What if the data isn't available?

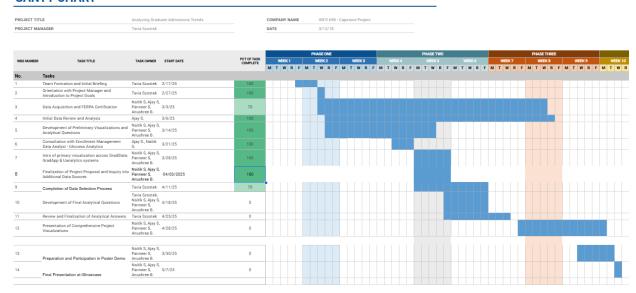If the required data is insufficient, incomplete, or unavailable:

- Adjust the scope to focus on programs or years with sufficient data.
- Document any potential impact on the findings due to data limitations.
- Use holistic data from the UAnalytics to generate meaningful reports.
- Handle the missing data by cleaning and preprocessing to make it more relevant.

Project Timeline & Gannt's Chart

This section was written by Naitik S.

Milestone	Date
Team Formation	02/17/2025
First meeting with Project Manager(Tavia) and Got Introduced to Project goals and data sources	02/27/2025
Requested the Data and learned more about the data sources and discussed UAIR and GradApp, Get FERPA Certificate	03/03/2025
We got hands-on First Data Dump	03/06/2025
Created some small visualizations and generated some questions that can be answered from the data	03/14/2025
We had a meeting with Kevin. (data analyst from the Enrollment Management department)	03/21/2025
Produced some potential questions and answered them by visualizations in Google colab; worked on Project Proposal	03/28/2025
We signed and finished the proposal, worked on potential questions, and inquired about the other data sources.	04/03/2025
Completion of data selection	04/11/2025
Formation of final and potential questions	04/18/2025
Review all the questions and answer them.	04/25/2025
Final Visualizations of all the Questions Answered	04/28/2025
Poster Demo	03/30/2025
iShowcase	05/07/2025

GANTT CHART

PROJECT TITLE	Analyzing Graduate Admissions Trends		COMPANY NAME	INFO 698 - Capstone Project
PROJECT MANAGER	Tavia Szostek		DATE	3/12/18

WBS NUMBER	TASK TITLE	TASK OWNER	START DATE	PCT OF TASK COMPLETE
No.	**Tasks**			
1	Team Formation and Initial Briefing	Tavia Szostek	2/17/25	100
2	Orientation with Project Manager and Introduction to Project Goals	Tavia Szostek	2/27/25	100
3	Data Acquisition and FERPA Certification	Naitik S, Ajay S, Panneer S, Anushree B.	3/3/25	70
4	Initial Data Review and Analysis	Ajay S.	3/6/25	100
5	Development of Preliminary Visualizations and Analytical Questions	Naitik S, Ajay S, Panneer S, Anushree B.	3/14/25	100
6	Consultation with Enrollment Management Data Analyst - UAccess Analytics	Ajay S., Naitik S.	3/21/25	100
7	Intro of primary visualization across GradSlate, GradApp & Uanalytics systems	Naitik S, Ajay S, Panneer S, Anushree B.	3/28/25	100
8	Finalization of Project Proposal and Inquiry into Additional Data Sources	Naitik S, Ajay S, Panneer S, Anushree B.	04/03/2025	100
9	Completion of Data Selection Process	Tavia Szostek	4/11/25	70
10	Development of Final Analytical Questions	Tavia Szostek, Naitik S, Ajay S, Panneer S, Anushree B.	4/18/25	0
11	Review and Finalization of Analytical Answers	Tavia Szostek	4/25/25	0
12	Presentation of Comprehensive Project Visualizations	Naitik S, Ajay S, Panneer S, Anushree B.	4/28/25	0
13	Preparation and Participation in Poster Demo	Naitik S, Ajay S, Panneer S, Anushree B.	3/30/25	0
14	Final Presentation at iShowcase	Naitik S, Ajay S, Panneer S, Anushree B.	5/7/25	0

The Gantt chart displayed herein is devised to meticulously chart the progression and temporal distribution of the various tasks associated with our project. We have delineated each task's initiation and completion dates. Key elements of the chart are as follows:

- Task Breakdown: The chart enumerates a sequence of interconnected tasks, each pivotal to the project's execution. These tasks range from forming the project team to the final presentation at the iShowcase.

- Timeline and Phases: The timeline extends from February 17, 2025, to May 7, 2025. It is segmented into four primary phases, each highlighted in distinct colors to underscore the project's phase transitions.

- Task Ownership and Management: Each task is assigned an owner, ensuring clear accountability. Tavia Szostek manages the project. This allocation aids in tracking responsibility and progress.

- Progress Tracking: The 'PCT OF TASK COMPLETE' column visually represents the completion status of each task using a percentage scale. Conditional formatting enhances this visualization, where shades of green indicate progress, transitioning from light green at lower percentages to dark green upon task completion.

- Milestones and Deliverables: Key project milestones, such as data acquisition, proposal finalization, and the development of final visualizations, are marked to indicate their critical nature within the project's scope.

Link for Gannt's Chart: 📗 Gantt chart

Ethics

#	Question	Generally	Data Breach
1	Could a user sell drugs or other illegal items on your platform?	No	No
2	Could a user of your platform engage in sex trafficking?	No	No
3	Could a user sell class notes or cheat on their homework on your platform?	No	No
4	Could a stalker use your project to find someone?	No	No
5	Could your app be used to spy on or track individuals?	No	No
6	Could your app/software access the camera or microphone and record things without users being aware?	No	No
7	If someone uses your platform, could they be re-traumatized or have their mental health impacted in some way?	No	No
8	Could your algorithm promote material that would traumatize or upset individuals?	No	No

9	Would your users be upset if the data you collect was given to someone else?	No	No
10	Could a data leak potentially lead to identity theft?	No	No
11	If your site was hacked, would users of that product potentially lose their job, spouse, or family?	No	No
12	Should there be an age limitation on your product?	No	No
13	Could someone use your product to find, contact, and potentially commit elder abuse?	No	No
14	If the data on your platform was breached, could it be used to blackmail the users?	No	No
15	Does the existence of your project imply that a particular racial group, gender, religion, or other protected category is inherently evil, gross, or unwanted?	No	No
16	Could your product be used to commit hate crimes against a specific group?	No	No
17	Does the primary content of your game or algorithm focus on something considered deeply unethical?	No	No

18	Does your game or software contain race, gender, or other stereotypes?	No	No
19	Could users of your app scam other individuals?	No	No
20	Is your particular algorithm biased towards predicting correctly only for one race, gender, or other group?	No	No
21	Are the users of your project, players of your game, or those being surveyed for your data aware of how their data will be used?	Yes	
22	What are the possible misinterpretations of your results? For example - would a white supremacist or misogynist be stoked about your results if they misinterpreted it?	No	No
23	Does the use or purchase of your data potentially contribute to a dangerous group or regime?	No	No
24	Could your virtual reality environment cause injury to the user?	No	No
25	Are your study participants or game players aware that their data will be collected and used?	Yes	

26	Does your game or app contain addictive design elements without benefit to the user?	No	No
27	Does your survey contain an aspect of compulsion or unusually large incentive, that would command users to take it even if it was to their detriment?	No	No
28	Could your research outcomes harm an individual or entity?	No	No

The data we would use to create dashboards for tracking admission trends and finding out a potential admission pipeline - from prospective students to admitted ones - to those enrolled in the university is all approved by the admission team. We do not use personally identifiable data for any students' data used for the analyses. In the case of data like that, we have already completed our FERPA training to access the same, and as a first step, we will scrub the same from the final dataset from all three source systems.

Explanation regarding the answers to ethical questions:

All the 'No' Answers:

All the 'No' responses exist because our project is designed with strict ethical guidelines and safeguards to prevent misuse, harm, or illegal activity. We do not support or enable illicit transactions, privacy violations, unethical data usage, discrimination, abuse, or exploitation. Our algorithms do not promote harmful or biased content or facilitate stalking, tracking, or surveillance without consent. We have implemented strong security measures to protect user data, ensuring it cannot be leaked, sold, or exploited in ways that could lead to identity theft, blackmail, or reputational harm. Additionally, our design principles avoid addictive patterns, unethical incentives, or any elements that could negatively impact mental health, reinforce stereotypes, or be misused for hate crimes. Maintaining these standards ensures our platform aligns with ethical best practices and legal compliance.

All the 'Yes' Answers:

The 'Yes' responses highlight our commitment to transparency and responsible data handling. Our project users, whether survey participants or platform users, know how their data is used. We ensure informed consent, making it clear that their information is collected for specific, approved purposes. Our project adheres to institutional guidelines, including FERPA regulations for student data, and we take proactive steps to anonymize sensitive information before analysis. These measures reflect our dedication to ethical data use and maintaining trust with all stakeholders.

Approvals

The signatures of the people below indicate an understanding of the purpose and content of this document by those signing it. By signing this document, you indicate that you approve of the proposed project outlined in this Statement of Work, the division of work, and the Ground Rules and that the following steps may be taken to create a Product Specification and proceed with the project.

This document is based upon and supersedes the Analyzing Graduate Admissions Trends Project Proposal & Statement of Work Version 1.0. Deviations (versus clarifications) from the PDR have been noted. The PRD requirements shall remain in effect for any requirements not listed in this SOW.

Approver Name	Title	Signature	Date
Tavia Szostek	Team Project Manager	*Tavia Szostek*	4.4.25
Ajay Sreekumar	Team Member	*Ajay Sreekumar*	4/3/2025
Anushree Biswas	Team Member	*Anushree Biswas*	4/3/2025
Panneer Selvam Mani Sekaran	Team Member	*Panneer Selvam Mani Sekaran*	4/3/2025
Naitik Shah	Team Member	Naitik Shah	4/3/2025
Tavia Szostek	Advisor	*Tavia Szostek*	4.4.25
Greg Chism	Instructor		

Section	Author	Word Count
Executive Summary	*Ajay Sreekumar*	*296*
Market Research	*Anushree Biswas*	*218*
Project Deliverables	*Anushree Biswas*	*226*
What Analysis is being reported?	*Panneer S.*	*227*
What Accuracy is expected?	*Panneer S.*	*244*
What if the Analysis doesn't work?	*Panneer S.*	*172*
What if the data isn't available?	*Panneer S.*	*56*
Project Timeline & Gannt Chart	*Naitik Shah*	*173 + GC*
Ethics, Approvals, Appendix	*Ajay S. / Naitik S.*	*688*

Appendix

A.   Advisor Engagement

1)   Project Team Responsibilities

·   The Project Manager will set up and facilitate a weekly call/meeting with the Faculty Advisor. The Project Team will provide weekly status updates to the Faculty Advisor, including upcoming deliverables, critical issues, and any adjustments to the Project Plan.

·   Documents will be provided to the Faculty Advisor with adequate time for review and signature. The time necessary for review will be agreed upon with the Advisor. The minimum review time will be 3 days before the document due date.

·   Design files will be provided to the Faculty Advisor as requested in a format agreed to with the Advisor.

·   Support requirements will be requested from the Faculty Advisor with the required dates and an adequate time to fulfill the request.

·   Modification requests to the Project Plan by the Faculty Advisor will be reviewed and agreed to within 1 week of the request.

2)   Faculty Advisor Responsibilities

·   The Faculty Advisor will provide knowledge and expertise to help the group stretch their skills.

·   The Faculty Advisor will participate in a weekly or bi-weekly call/meeting with the Project Team to review the project status, upcoming deliverables, priorities, issues, and progress to the agreed Project Plan.

·   The Faculty Advisor will provide document review, feedback and approval, rejection, and approval with contingencies with adequate time for the Project Team to meet the course due dates.

·   The Faculty Advisor will provide feedback on requested support requirements from the Project Team. This includes feedback and guidance on design implementation decisions, design files, test plans, procedures, and test results.

· The Faculty Advisor shall provide technical advice and guidance to the Project Team, answering inquiries approximately 1 hour weekly.

· Modifications to the Project Plan by the Project Team will be resolved and documented within 1 week of the request.

· Grade the finalized project using a skill-based rubric

· Attend iShowcase in May.

B.   Ground Rules

As a team and as individual team members, we agree to:

1. **Stay focused on our objectives and goals.**
   Each time the team meets, we will clearly define our objectives and desired outcomes at the beginning of the meeting. We will politely remind team members if we are getting off track.

2. **"Sidebar" any issues that are relevant but not consistent with the immediate objectives.**
   Occasionally, important matters are raised that are not relevant to the immediate goals of the meeting. To keep the group on track, but avoid losing the issue, create a "sidebar" where these topics can be listed and discussed later.

3. **Listen when others are speaking.**
   We will listen and consider others' input before adding our own comments.

4. **All viewpoints will have an opportunity to be heard.**
   We understand that some team members may be quieter than others. We will try to get each team member's viewpoint so that no one dominates the discussion.

5. **Differences of opinion will be discussed respectfully**
   We will identify areas of agreement before assessing areas of disagreement. We will encourage each other to look beyond our own point of view. We will discuss different ideas respectfully. As a team, we will weigh the merits of different opinions and agree on a process for choosing a direction. All team members will respect and follow the decision or direction.

6. **Look for the good points in new ideas.**
   We will explore the value of each idea as we assess and select our path forward.

7. **Focus on the future, not the past.**
   We will use our past experience to inform our decisions but focus the discussion on future objectives. Blame for past performance is counterproductive; we will focus on finding solutions.

8. **Agree upon specific action items and next steps.**
   At the end of each meeting and discussion, we will summarize and agree on specific next steps, action items and assignments.

9. **Accountability**

As team members, we will each be responsible for our individual assignments and contribution to achieving the team objectives and goals. We will honor our responsibilities and not let our team members down.