Data Analysis for Information Systems

Spring 2025

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TA: Sripathi Sridhar (ss645@njit.edu)
Format: In-person
In-person Location: Central King Building 314
Class Hours: Monday 2:30 - 5:20 pm
Office Hours: Friday 1:30-3:30 pm in GITC 3902 or by appointment

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Course Description

This graduate-level course introduces students to the world of data analytics from an information systems perspective, focusing on the application of various data analysis techniques in business practices. We cover a wide spectrum of topics ranging from fundamental statistics to databases, data warehouses, data visualization, and data mining. Being an introductory course, our approach is "shallow and wide", emphasizing giving students a complete view of the data analytics profession, covering as many different sub-areas as time allows while not diving too deep into any one specific domain. The goal is to serve as a "guided tour" for students to gain knowledge about the different sub-areas of data analytics and understanding of which area is a best fit for their personal development. More in-depth materials and discussion for each sub-area will be provided upon students' requests. Course topics include the rudiments of probability, statistics, visualization, data warehousing, OLAP analysis, and data mining algorithms.

Course Goals

At the end of this course, the student should be able to:
1. Build a foundation of data analysis such as statistics, probability theories, data structure and algorithms, database and data warehouse, data visualization, basic data mining techniques (e.g. decision trees, clustering, etc), and Python programming.
2. Apply them to real-world data sets for data analysis.
3. Communicate the results of data analysis.

The students will learn to work with the following tools:
- Excel
- Tableau
- Altairr AI Studio (RapidMiner)

- Python

Textbook and readings

Considering the wide range of topics covered in this class, we will use PowerPoint slides and a collection of papers/articles/chapters for our class.

Assignments

We will have the following assignments. Details on each assignment will be posted on Canvas.

Labs

There will be several labs in class. Your participation is expected for these labs, and absence during the lab results in 0 points for that lab. ***Laptops will be needed for labs.***

At-Home Assignments

There will be several at-home assignments over the semester. Some of these are individual assignments, e.g., students will write a short reflection on the reading, and some of these are group assignments, e.g., groups will develop and present a short (10-minute) PowerPoint presentation to summarize the assignment paper.

In-class Quizzes

There will be several small in-class quizzes. When there is a quiz, it will be announced in advance.

Projects

Objective: To demonstrate the ability to apply data analytics techniques to solve real-world problems.
Summary: Two projects will be assigned to teams throughout the semester.

Project 1: Data Visualization Project

Teams are expected to find an interesting data set and visualize it using Tableau. Each team will then post the visualization model around midterm. Since we have no midterm exam in this class, this will count as the midterm milestone.

Project 2: Data Mining Project

Teams are expected to work with a real-world organization to gather a data set, analyze it, and try to extract insightful information/knowledge using Altair AI Studio (RapidMiner) and/or Python.

Grading policy

The class will be graded on a 100-point scale.

A	90 and up
B+	85 to 89
B	80 to 84
C+	75 to 79
C	70 to 74
F	Less than 70

Point distribution:
- 5 pts. Labs
- 20 pts. At home assignments
- 10 pts. Quizzes
- 40 pts. Group projects
- 25 pts. Final exam

Excellent participation demonstrated by preparation for discussion and thoughtful contributions (online and in class) will have the effect of raising a final letter grade by one value (e.g. B to B+, or B+ to A). Likewise, poor participation demonstrated by a consistent lack of preparation for discussion and little or no thoughtful contributions (online and in class) will have the effect of lowering a final letter grade by one value (e.g. A to B+, B to C+).

Late Assignments Policy

Unexcused late submission of homework receives a 20% penalty. This means that you start with 8 out of 10 points as the maximum. Assignments submitted one week after they are due or after graded assignments are returned or reviewed (whichever comes first) receive no credit.

Quiz Policy

- Please bring your pen/pencil, as the quiz will be on paper.

- If you miss the quiz with a valid reason (e.g., lateness or absence vilified by DOS) and in advance notice, you can schedule an in-person meeting with the lecturer or TA to take the quiz. But, you will not be able to take the quiz after the results have been announced (most likely, before the next class).

Attendance Policy

Students are expected to attend every class on time.
- **If you miss 3 class sessions, you will automatically be deducted a letter grade.**
- **If you miss 5 class sessions, you will automatically fail the course.**
- **Students who arrive after the attendance call/quiz or leave before the class officially ends will be marked as late. Accumulating 3 late attendance will count as 1 absence.**

Please contact the Office of the Dean of Students (DOS) to verify your absence. For more details, please see the Student Absence Verification section below.

Even when you don't have a valid (DOS verifiable) reason and cannot attend class, **I strongly encourage you to notify me in advance** (not after the class). I will try to consider your situation, though I cannot guarantee to what extent.

Student Absence Verification

Students should contact the Office of the Dean of Students (DOS) to verify their absence when missing class due to bereavement, medical concerns, military activity, legal obligations, or university-sponsored events.

Once the absence has been verified, the DOS will communicate to your professor(s) on your behalf. Please note that our office only verifies documentation, and it is at the discretion of your professor(s) or their department's policy to provide any accommodation. It is the student's responsibility to follow up with the professor(s). Students who select an option (bereavement, medical concerns, etc.) that does not match the presenting concern and supporting documentation will be rejected.

For more information, please see https://www.njit.edu/dos/student-absence-verification.

Class environment

Please do your part by seeking to promote the success of others, and by treating each other in ways that respect and celebrate the diversity of talent that is drawn to this field. The classroom

is an open forum for discussion, and I encourage all students to feel free to ask questions in class. Please do not be afraid to ask any question, no matter how basic it may seem. What is basic to some of the class may be completely new to the rest.

Accessibility

If you are in need of accommodations due to a disability please contact Chantonette Lyles, Associate Director of the Office of Accessibility Resources & Services (OARS), Fenster Hall Room 260 to discuss your specific needs. A Letter of Accommodation Eligibility from the OARS authorizing your accommodations will be required.

Academic Integrity

Academic Integrity is the cornerstone of higher education and is central to the ideals of this course and the university. Cheating is strictly prohibited and devalues the degree that you are working on. As a member of the NJIT community, it is your responsibility to protect your educational investment by knowing and following the academic code of integrity policy that is found at: NJIT Academic Integrity Code.

Please note that it is my professional obligation and responsibility to report any academic misconduct to the Dean of Students Office. Any student found in violation of the code by cheating, plagiarizing or using any online software inappropriately will result in disciplinary action. This may include a failing grade of F, and/or suspension or dismissal from the university. If you have any questions about the code of Academic Integrity, please contact the Dean of Students Office at dos@njit.edu

Generative AI Policy

Student use of artificial intelligence (AI) is permitted in this course for certain assignments and activities and is recommended to speed up the development of plotting and data-wrangling code. However, it is recommended to only use such tools as an assistant when coding, since you will be expected to fully understand any code you submit and will be assessed on exams accordingly with that expectation. Furthermore, it is not permitted to be used in reading assignments, reports, and presentations (with the exception of generated images in presentations), as this would impact the student's own efforts and understanding.

Feedback

I will solicit (anonymous) feedback from students throughout the course through anonymous surveys in Canvas, but if you have pressing or specific issues, please do not hesitate to let me know if any aspect of our course or class community can be improved.

Schedule

Tentative. Subject to modification as the semester progresses.

WEEK	TOPIC
1 (1/27)	- Course Introduction - Introduction and overview of data analysis
1/27	Last day to add/drop a class
2 (2/3)	- Data basics - Descriptive statistics - Lab: Data collection
3 (2/10)	- Data visualization and reporting - Lab: Excel basics
4 (2/17)	- Inferential statistics - Lab: Hypothesis testing
5 (2/24)	- Dimensionality reduction - Lab: Tableau
6 (3/3)	Visualization mini-project
7 (3/10)	- Data management - Lab: Data warehouse
3/17-3/21	Spring Break
8 (3/24)	Project 1 Presentation
9 (3/31)	- Introduction to data mining - Lab: Python basics with NumPy, Pandas, and Matplotlib
10 (11/5, 11/8)	- Decision Trees - Lab: Decision trees
4/7	Last day to withdraw from classes
11 (4/7)	Other classification and regression algorithms
12 (4/14)	- Clustering - Lab: Clustering
13 (4/21)	- Association rules and probability - Lab: Association Rules - Final project check-in

14 (4/28)	● Course review and preparation for the final exam ● Final project presentation
15 (5/5)	● Final project presentation (continued)
15 (5/10-5/16)	● Final exam