IS 665: Data Analytics for Information Systems

Spring 2025 Semester

Course Modality:

This is an online course, which will be conducted fully online, asynchronously via Canvas. For more information on using Canvas and other supported learning tools, visit the IST Service Desk Knowledgebase.

Instructor Information

Instructor	Email	Office Hours
Mark Cartwright (you can call me Dr. Cartwright or Prof. Cartwright)	mark.cartwright@njit.edu	Via Zoom by Appointment

*I will respond to all emails/Inbox messages within 24 hours.

General Information

Course Description

This course gives a graduate level introduction to data analysis, probability and statistics from an information systems perspective, including many of the techniques that are most relevant to the profession of Data Scientist for business, data and web analytics, as well as current data sets. We will learn and conduct Python, MATLAB and R based manipulation of data. Course topics include the rudiments of probability and random variables, estimation, special distribution and sampling, Markov processes, hypothesis testing, graphics and visualization.

Prerequisites/Co-requisites

IS 601

Course Learning Outcomes

By the end of the course, students will be able to:

- CLO1: Build basic concepts and techniques in statistics, probability theories, data structure and algorithms (such as descriptive statistics and regression analysis) and apply them to real world data sets.
- CLO2: Discuss the role of data analytics in supporting decision making.
- CLO3: Design data warehouse using Star Schema and Dimensional Modeling
- CLO4: Design and build data visualization using Tableau.
- CLO5: Apply commonly used data mining techniques such as neural networks, decision tree, association rules, clustering, genetic algorithm, SVM, Bayesian Networks, etc.
- CLO6: Implement the aforementioned machine learning algorithms in Python.
- CLO7: Apply data mining algorithms to real world data sets in the context of web mining, text mining, transaction mining, etc. using Altair AI Studio.

Students will learn to work with the following tools:

1. **Excel** (for Pivot Table and Solver)
2. **Tableau** (for visualization and data preprocessing)
3. **Altair AI Studio (formerly Rapid Miner)** (for data mining using a graphic interface)
4. **Python** (for machine learning algorithms using Anaconda and Jupiter Notebook)

Required Materials

N/A

Grading Policy

NJIT Grading Legend

Final Grade Calculation

Final grades for all assignments will be based on the following percentages:

Discussion Forums	**10%**
Assignments	**20%**
Group Project	**10%**
Final Exam	**20%**
Projects (Project 1= 20%, Project 2 = 20%)	**40%**

Course Work

Discussion Forums: (10% of grade) There are ten discussions throughout the semester (about once per week). Students are expected to participate in each discussion and make **meaningful** contributions. A comment such as “I agree!” does not count. When all students participate in a discussion, it creates an active learning environment that will help you better understand the materials and be more successful in the class. Initial posts are due Thursday by 11:59PM. Follow-up posts are due Sunday by 11:59PM.

Assignments: (20% of grade) There will be frequent assignments (about 1 per week) throughout the semester. They are usually individual assignments and are designed to reinforce your understanding of the material.

Group Project (10% of grade) There is one group project. For each one, each team needs to read an assigned article, make a PPT presentation to summarize the article, and lead a discussion on the topic.

Final Exam: (20% of grade) One comprehensive final exam will be given towards the end of the semester. Its format and coverage will be discussed two weeks before the exam.

Projects: (**40% of grade**) **Two** projects will be assigned to teams throughout the semester. More details regarding the projects can be found in the "project" module on campus.

- **Project One: Data Visualization (20% of grade):** Teams are expected to find an interesting data set and visualize it using Tableau (or PowerBI if they prefer). 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 Two: Data Mining (20% of grade):** 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 Python, Altair AI Studio or SPSS Modeler. This project is due at the end of the semester.

Feedback

I will deliver feedback on each assignment using the comments feature in Canvas. I will respond to emails within 24 hours. Grades and feedback on assignments will be provided within a week after submission.

Letter to Number Grade Conversions

A	90-100
B+	85-89
B	80-84
C+	75-79
C	70-74

A	90-100
F	0-69

Exam Information and Policies

This course has one exam and it will use Respondus Lockdown Browser and Monitor to proctor the exam. For more information on the proctoring program, see below. Per the NJIT Online Course Exam Proctoring Policy, this course will use authentic assessment, meaning you will be assessed and graded on your ability to deliver real-world outputs as well as your participation and feedback to other students.

Respondus LockDown Browser and Monitor

The Respondus proctoring solution has three possibilities:

1. **LockDown Browser***:* A locked browser used to prevent students from printing, copying, going to another URL, or accessing other applications during an assessment in Canvas.
2. **Monitor:** Used in conjunction with LockDown Browser, Monitor is the usage of a webcam to record a user during the exam session.
3. **Live Proctoring:** Used in conjunction with both LockDown Browser and a video conferencing solution, the instructor live proctors students during the assessment.

If virtual machine software is detected on your device, you won't be able to run LockDown Browser, and you'll receive a warning, "The browser can't be used in virtual machine software such as Virtual PC, VMWare, and Parallels." You can find examples of VM software and troubleshooting steps on Respondus's FAQ page for this topic.

If you want to take your exam on your iPad, you must ask your instructor to enable this feature from within the course settings and download the LockDown Browser app.

In using LockDown Browser, students need:

- High-speed internet connection
- Windows or Apple Operating System

In using Monitor or Live Proctoring, students need:

- Webcam (internal or external)
- Microphone and Audio (internal or external)
- NJIT ID or Photo-Issued ID
- To perform an environment check

Helpful Resources:

- Introduction to Respondus LockDown Browser for Students Video
- Respondus Monitor Resources
- Respondus Computer Requirements
- Tips for Ensuring a Smooth Experience
- Respondus Privacy Policies
- Questions or Problems? Contact:
    - Respondus Live Chat
    - IST Service Desk: 973-596-2900 or Help.njit.edu

Policy for Late Work

Unexcused late submission of any work 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.

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 NJIT academic code of integrity policy.

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."

Netiquette

Throughout this course, you are expected to be courteous and respectful to classmates by being polite, active participants. You should respond to discussion forum assignments in a timely manner so that your classmates have adequate time to respond to your posts. Please respect opinions, even those that differ from your own, and avoid using profanity or offensive language.

Weekly Expectations

This course is organized by weekly modules. In each module, students must watch a lecture video and complete the assigned reading, discussion, and/or assignment. If a team assignment is given, students are expected to actively participate in the teamwork preparing for deliverables.

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.

Course Schedule

Week/ Module	Topics	Assignment	Due Date
1	**The One About Us** Where we introduce ourselves, talk about what we want to learn, and customize our class together	Introductions Module 1 Discussion: Competing on Analytics	Initial posts due by Thursday 11:59PM; Responses to peers due by Sunday 11:59PM
2	**The One on Business Value of Data Analytics** Where we talk about why data analytics is needed today	Module 2 Discussion: Takeaway from "Competing on Analytics" Start Group Project: Why Data Analytics?	Initial posts due by Thursday 11:59PM; Responses to peers due by Sunday 11:59PM
3	**The One on Fundamentals (I)** Where we start our journey and discuss the basics: Data type, data collection and data description, pivot table and pivot analysis	Module 3 Discussion: What can YOU do with Excel Data Analysis? Assignment 1 Part 1: Simple Data Analysis Using Excel Assignment 1 Part 2: Pivot Table Analysis	Initial posts due by Thursday 11:59PM; Responses to peers due by Sunday 11:59PM Assignments due by Sunday 11:59PM

4	**The One on Fundamentals (II)** Where we look at more advanced data structures, discuss algorithms behind web crawler, and build a word game using Python	Module 4 Discussion: Application of BFS and DFS in Real World Assignment 2: Build the Wordle Game with Python Submit Group Project: Why Data Analytics?	Initial posts due by Thursday 11:59PM; Responses to peers due by Sunday 11:59PM Assignments due by Sunday 11:59PM Group Reading Assignment due by Sunday 11:59PM
5	**The One on Fundamentals (III)** Where we look at trees, database indexing, and review database basics	Module 5 Discussion: You and Database Assignment 3: Data Structures: DFS, BFS and Trees	Initial posts due by Thursday 11:59PM; Responses to peers due by Sunday 11:59PM Assignments due by Sunday 11:59PM
6	**The One on Data Warehouse** Where we explore dimensional model, the conceptual design tool for data warehouse, and work with ETL and covers topics in Star Schema and Dimensional Modeling, and ETL Process Advanced Data Warehouse Topics	Module 6 Discussion: Data Warehouse vs. Data Lake Assignment 4: Dimensional Modeling for CRM Using Clickstream Data	Initial posts due by Thursday 11:59PM; Responses to peers due by Sunday 11:59PM Assignments due by Sunday 11:59PM
7	**The One About Data Visualization (I)**	Module 7 Discussion: Data Visualization Techniques	Initial posts due by Thursday 11:59PM;

	Where we get to know data visualization for the first time and we review dashboard and scorecard Visualization and its business values		Responses to peers due by Sunday 11:59PM
8	**The One About Data Visualization (II)** Where teams compete on using visualization to solve a real world mystery	Module 8 Discussion: Data Visualization Group Project Forum Assignment 5: Mini Team Project	Initial posts due by Thursday 11:59PM; Responses to peers due by Sunday 11:59PM Assignments due by Sunday 11:59PM
9	**Midterm Presentation**	Project 1: Data Visualization	Project 1 due by Sunday 11:59PM
10	**The One About Association Rules** Where the three types of data mining tasks are introduced along with topics on supervised learning vs. unsupervised learning and Association Rule Mining	Module 10 Discussion: Association Rule Mining-Problem Formulation	Initial posts due by Thursday 11:59PM; Responses to peers due by Sunday 11:59PM
11	**The One About Clustering** Where clustering is introduced	Module 11 Discussion: Project 2 Update Assignment 6: Clustering Using Python	Initial posts due by Thursday 11:59PM; Responses to peers due by Sunday 11:59PM

			Assignments due by Sunday 11:59PM
12	**The One About Classification (I)** Where all types of regression is introduced	Module 12 Discussion: Regression Analysis Assignment 7: Regression Analysis	Initial posts due by Thursday 11:59PM; Responses to peers due by Sunday 11:59PM Assignments due by Sunday 11:59PM
13	**The One About Classification (II)** Where Decision Tree and kNN are discussed	Module 13 Discussion: Project 2 Discussion	Initial posts due by Thursday 11:59PM; Responses to peers due by Sunday 11:59PM
14	**The One About Classification (III)** Where Neural Networks and Naive Bayes are discussed	Module 14 Discussion: Project 2 Update	Initial posts due by Thursday 11:59PM; Responses to peers due by Sunday 11:59PM
15	**Final Exam**	Project 2: A Case Study in Data Mining Final Exam	Assignments due by Sunday 11:59PM Final Exam due by Sunday 11:59PM

Additional Information and Resources

Accessibility:
This course is offered through an accessible learning management system. For more information, please refer to Canvas's Accessibility Statement.

This course uses the following programs. Click on links below for each programs accessibility statements:

- Microsoft Excel Accessibility page
- Tableau Accessibility page
- Python Accessibility page

Requesting Accommodations:

The Office of Accessibility Resources and Services works in partnership with administrators, faculty, and staff to provide reasonable accommodations and support services for students with disabilities who have provided their office with medical documentation to receive services.

If you are in need of accommodations due to a disability, please contact the Office of Accessibility Resources and Services to discuss your specific needs.

Resources for NJIT Online Students

NJIT is committed to student excellence. To ensure your success in this course and your program, the university offers a range of academic support centers and services. To learn more, please review the “Student Services” page in Canvas, which includes information related to technical support.