



FIN620 Advanced Financial Data Analytics Syllabus

Spring 2025

Course Modality:

This is a Hybrid Course - Meets Alternate Weeks. Face-to-face meetings will be in alternate weeks starting- **Tuesday 1/28/2025 in CKB 124**. The online meetings will take place asynchronously through Canvas.

For more information on using Canvas and other supported learning tools, visit the IST Service Desk Knowledgebase.

Course Workload: This course values your time and effort and aims to provide a rewarding learning experience. You can expect to dedicate approximately **7.5 hours** to the course per week. This estimate includes, but is not limited to, time spent on class room (face to face meeting), readings, watching course videos, completing assignments, participating in discussions, and reviewing feedback.

Instructor Information

Instructor	Email	Office Hours
Ajim Uddin	au76@njit.edu	Send an email for an appointment.

*I will respond to all emails/Inbox messages within 48 hours. Allow up to 2 weeks for feedback on submitted assignments. This feedback will be provided in Canvas.

General Information

Course Description

The financial services industry contains numerous data driven applications. For example, large financial institutions utilize Python in tandem with other established technologies to build, enhance, and maintain portions of their core IT and modeling systems. There are also many hedge fund and asset management firms that make heavy use of Python programming when it comes to efficient

financial application and data analytics development. Establishing a quantitative view and mastering analytical approaches are critical nowadays for students and professionals in the finance industry. This course will provide essential skills in financial data analytics.

Prerequisites/Co-requisites

FIN 616 or instructor's approval, and familiarity with at least one programming language (for example, C, Java, Python, R or MATLAB).

Course Learning Outcomes

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

- 1. Apply econometric models and theories to analyze financial data.
- 2. Assess econometrics models and portfolio theories.
- 3. Apply time-series and panel data estimation tools in modeling financial data.
- 4. Analyze financial data using tools such as Python and Python libraries.
- 5. Apply the concept of mathematical finance for asset pricing and portfolio management.
- 6. Synthesize algorithms and data from public sources to produce business results and knowledge.
- 7. Evaluate the current state-of-the-art quantitative finance tools and machine learning algorithms.

Required Materials

We will cover materials from various sources. Below is a list of books and resources. Most of these materials can be obtained for free or at a nominal cost. You are encouraged to use the permalink provided so you may access the resources online for free. When accessing library materials through the permalinks provided in the course, you must authenticate your NJIT affiliation. This typically requires logging in with your UCID and Duo Two-Factor Authentication. If you're off-campus, you may encounter additional steps to access resources. If you have any issues, please refer to the <u>Off-Campus Access Research Guide</u> for further instructions on accessing library materials remotely.

- Quantitative Finance with Python: A Practical Guide to Investment Management, <u>Trading</u>, and <u>Financial Engineering</u> (Chapman and Hall/CRC Financial Mathematics Series) 1st Ed. By Kris Kelliher ISBN: 978-1032014432
- Empirical Asset Pricing; The cross section of Stock Returns. By Turan Bali, Rovert Engle, and Scot Murray. ISBN: 9781118095041
- An open-source book that thoroughly discusses deep learning techniques along with python implementations. A great book if you are interested in deep learning: <u>Dive into</u> <u>Deep Learning</u> by Aston Zhang, Zack C. Lipton, Mu Li, Alex J. Smola.

Non-required Additional Resource:

• **Python for Finance: Analyze Big Financial Data,** by Yves Hilpisch, ISBN: 9781491945285

Grading Policy

NJIT Grading Legend

Final Grade Calculation

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

Quizzes	10%
Discussion/Reflection Forums	15%
Five Python Assignment (the lowest grade will be dropped) (4 x 10)	40%
Project (Milestone 1 = 5%, Milestone 2 =10%,	35%
Milestone 3 = 5%, Milestone 4 = 15%)	

Course Work

Quizzes: (10% of grade) There will be frequent multiple-choice quizzes throughout the course. They are meant to help you practice course concepts. These will typically take place at the beginning of in-person meetings.

Reflections/Discussion Forums: (15% of grade) You are expected to participate in discussion forums in Canvas, **specially for the online weeks**. 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. You will post your initial response to the prompt by Saturday at 11:59 pm and respond to one classmate by Monday at 11:59 pm of the week they are listed.

Assignments: (40% of grade): There will be biweekly/triweekly python assignments based on the materials covered during that module. These assignments are designed to help you practice using data analytics tools with real-world data and develop business insights. I will drop your lowest score and only count your best four assignments toward your final grade. These assignments are designed to help you practice using data analytics tools with real-world data and develop business insights.

Project: (**35% of grade**) Throughout this course, you will design and execute your own Financial Data Analysis project. This individual project has four milestones or deliverables: Check-in Meeting (with Instructor), Project Proposal, Video Presentation, and Final Paper. There will be opportunities to iterate and revise your work based on peer and instructor feedback. It is crucial to take this project seriously and work on it consistently. You will apply the knowledge and techniques learned to perform your own data analysis and present the results in a scholarly manner. Please see the Financial Data Analysis Project Overview page in Canvas for more information.

Python Practice: Each week, the lecture will be accompanied by Python scripts that illustrate key concepts covered in class. It is highly recommended that you review and practice these scripts weekly. Engaging with the Python code will not only reinforce the course material but also equip you with the tools necessary to tackle the assignment questions effectively. Although the Python practice is not graded, consistent practice is essential for mastering the technical skills required in financial data analytics and will be crucial to your success in the course.

Feedback

I will provide feedback on each assignment through the comments feature in Canvas. Additionally, for urgent matters or important announcements, I will email you. Therefore, be sure to regularly check your emails and take notice of any emails from me, au76@njit.edu.

Letter to Number Grade Conversions

A	90-100
В+	85-89
В	80-84
C+	75-79
С	70-74
F	0-70

Important Note on Course Commitment and Grading

Success in this class requires consistent effort and engagement. To succeed in this class, you should:

• Be engaged by actively participating in discussions, exercises, and activities to deepen your understanding.

• Submit all course deliverables in a timely and professional manner.

With less preparation and participation, you can expect a lower grade.

It's important to approach this class with seriousness and commitment from the very beginning. In past terms, some students have been casual about their participation early on, only to seek extra-credit opportunities or extensions towards the end of the term when facing low grades. Please understand that these opportunities are not fair to other students and will not be granted. The grading system outlined in this syllabus is final, and no additional chances for extra credit or deadline extensions will be provided.

Therefore, ensure you are fully engaged and diligent throughout the entire course to achieve the best possible outcomes.

Exam Information and Policies

This course does not have any exams. Per the NJIT <u>Online Course Exam Proctoring</u> <u>Policy</u>, 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.

Policy for Late Work

All assignments and projects are expected to be submitted by the due dates specified in the syllabus. Late submissions will be penalized as follows:

- First day late: 40% deduction from the total points.
- Each additional day late: 20% deduction per day.
- More than 4 days late: 0 points will be awarded.

Exceptions will be made only for severe illnesses or emergency situations. In such cases, legitimate documentation of the emergency must be presented and approved by the Office of the Dean of Students before any extensions are granted.

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 <u>NJIT academic code of integrity</u> <u>policy</u>.

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 <u>dos@njit.edu</u>"

Generative AI

Generative AI is a great invention of modern science and an excellent tool for learning assistance. However, it has some limitations and is also notorious for hallucinating and generating flawed results. Therefore, as humans, we are responsible for ensuring that the generative text, ideas, or solutions are valid and truthful. You may use generative AI for brainstorming and idea generation when working on discussions, projects, and assignments (not quizzes). However, carefully fact-check anything from generative AI before using it in this class. If it is not factual, you will lose points. There are specific guidelines for using Generative AI in this course:

Discussions: Feel free to use Generative AI for brainstorming, but don't just copy and paste what it generates. Use other materials from the class or books to fact-check. You can check grammar with Generative AI.

Quizzes: No generative AI is allowed.

Assignments: You can use generative AI for brainstorming or finding solutions to assignment problems. If the AI-generated solution meets the problem's requirements and you understand it, that's great; you will get full points. However, from my experience, AI-generated code snippets often solve only partial problems. You need to work meticulously with them to understand what part is missing and regenerate the solution accordingly. If you submit code that solves only partial requirements, you will receive partial credit.

Note: I will not troubleshoot any generative AI codes

Project: Similar to assignments, you can use Generative AI for brainstorming, coding, and checking grammar. However, I do not suggest you use generative AI for writing, and you cannot copy and paste directly. Any material Generative AI suggests, make sure to check the original source, and cite accordingly. I will use Turnitin to evaluate your project report. If the Turnitin report shows that most of your report was generated by generative AI, I will return it to you and/or deduct points.

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 into weekly modules. The week runs from Tuesday through Monday. All assignments, including homework, are due by the end of each week on Monday at 11:59 pm. Each week, students must watch lecture videos, complete readings, and assignments, and participate in the class discussion forums. Links to the videos and

readings required for each week can be found in the Canvas overview and learning pathway page for each module. In addition, students are expected to finish and submit their homework assignments by Monday at 11:59 pm.

Module/ Week	Торіс	Assignment [Due Dates
1 Online	Introduction Quantitative Finance, and Theoretical Underpinnings of Quant Modeling	 M1 Recall Introduce Yourself! M1 Discussion 	1/27
2 F2F	Intro to Python, GitHub, NumPy, Array, Pandas, Matplotlib	1. M2 Quiz	1/28
3 Online	Working with Financial Datasets	1. M3 Assignment	2/10
4 F2F	Estimation, Inference, and Hypothesis Testing	1. M4 Quiz	2/11
5 Online	Cross-Sectional Data	1. M5 Assignment	2/24
6 F2F	Time Series Data	1. Project Milestone 1	2/25
7 Online	Panel Data Estimation	1. M7 Assignment	03/10
8 F2F	Portfolio Theory	1. Project Milestone 2	03/11 03/17
9 Online	Factor Models	1. M9 Discussion	03/31
10 F2F	Asset Pricing Test & Fama Macbeth Regression	1. M10 Assignment	04/01 (Assignment Submission 04/07)
11 Online	Introduction to Machine Learning, Different Machine Learning Models	1. M11 Discussion 2. M11 Quiz	04/14
12	High Dimensional Data	1. M12 Assignment	04/15

Course Schedule

F2F			
13	Alternate Data: Textual and	No Assignment, work on	
Online	Sentiment Analysis	Project	
14			0.4/00
F2F	Deep Portfolio Management	1. Project Milestone 3	04/29
15	Course Recap and Future	1. Project Milestone 4	04/10
Online	Outlook	2. M15 Reflection	04/10

*Online indicates we do not meet in person for this class (Asynchronous Class), **F2F indicate we** meet in-person in CKB 124

Additional Information and Resources

Accessibility:

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

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 <u>Office of</u> <u>Accessibility Resources and Services</u> 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.