



FRE 7773, Machine Learning in Finance

Instructor Information

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Course Information

- **Course Number:** FRE 7773
- **Title:** Machine Learning in Finance
- **Description:** Overview machine learning and its applications to finance
- **Pre-requisite:** Undergraduate level understanding of probability, linear algebra and familiarity with a programming language, such as Python programming is expected
- **Class:** Friday 6-8:30 PM

Course Overview and Goals

This course is an introduction to Machine Learning concepts and its practical application to the financial industry. Leveraging the professors' collective experience in academia and industry, this course is designed to prepare students for data science oriented situations they may encounter in their first few years at a financial institution.

Upon completion of this course, students will be able to:

- Build predictive models using Machine Learning techniques in Python, including trading strategies.
- Have an understanding of the landscape and taxonomy of Machine Learning in order to further pursue individual topics of interest.
- Employ a baseline knowledge of Machine Learning in a professional environment.

Course Requirements

Class Participation

Students are expected to attend all classes and participate in class discussions.

Assignments

6 HWs (70%). Generally Python /Jupyter based.

Tests & Quizzes

Final Project (30%) with presentation to class.

Assigned Readings

Each lecture will have specific readings assigned prior to class.

Grading of Assignments

The grade for this course will be determined according to the following formula:

Assignments/Activities	% of Final Grade
Assignment (6 Total)	70%
Final Project	30%



Letter Grades

Letter grades for the entire course will be assigned as follows:

Letter Grade	Points	Percent
A	4.00	Example: 92.5% and higher
A-	3.67	Example: 90.0 – 92.49%
B+	3.33	Example: 87.5% - 89.99%
B	3.00	Example: 82.5% - 87.49%
B-	2.67	Example: 80% - 82.49%
C+	2.33	Example: 77.5% - 79.99%
C	2.00	Example: 70.0% - 77.49%
F	.00	Example: 69.99% and lower

View Grades

Grades are available to students on NYU Classes.

Course Schedule

Topics and Assignments

Week/Date	Topic	Reading	Assignment Due
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Week 1	Course Overview; ML in Finance Use Cases; Tools	Big Data & AI Strategies, Kolanovic & Krishnamachari (First Chapter)	None
Week 2	FinTech Primer; Entity Resolution	Cashing in on innovation: a taxonomy of FinTech (Fabozzi & Imerman); Policy responses to fintech: a cross-country overview (BIS)	None
Week 3	Signal Detection in Noisy Financial Data	TBD	HW1
Week 4	Decision Trees, Ensembles & Interpretation: Part I	TBD	None
Week 5	Decision Trees, Ensembles & Interpretation: Part II	TBD	HW2
Week 6	Feature Selection & Deploying a Model to GCP: Part I	TBD	None
Week 7	Feature Selection & Deploying a Model to GCP: Part II	TBD	None
Week 8	Second half overview; NLP and ML Sys; use cases	TBD	None
Week 9	NLP Fundamentals: Good Ol' NLP	<ul style="list-style-type: none"> How to Write a Spelling Corrector 	HW3



Week 10	NLP Fundamentals: Going Neural	<ul style="list-style-type: none"> • The Unreasonable Effectiveness of Recurrent Neural Networks 	None
Week 11	The “golden era of NLP”: large language models	<ul style="list-style-type: none"> • TBC 	None
Week 12	From Theory to Practice: How to organize ML projects	<ul style="list-style-type: none"> • Beyond Accuracy: Behavioral Testing of NLP models with CheckList 	HW4
Week 13	Are models that important?	<ul style="list-style-type: none"> • Everyone wants to do the model work, not the data work 	None
Week 14	Putting it all together: an end-to-end workflow	<ul style="list-style-type: none"> • You Do Not Need a Bigger Boat: Recommendations at Reasonable Scale in a (Mostly) Serverless and Open Stack 	None

Tests and Quizzes

- The Final will be project/presentation based and due on the last day of class unless otherwise stated in class.



Course Materials

Required Textbooks & Materials

- None

Resources

- **Access your course materials:** [NYU Classes](https://nyu.edu/its/classes) (nyu.edu/its/classes)
- **Databases, journal articles, and more:** [Bern Dibner Library](https://library.nyu.edu) (library.nyu.edu)
[NYU Virtual Business Library](https://guides.nyu.edu/vbl) (guides.nyu.edu/vbl)
- **Obtain 24/7 technology assistance:** Tandon IT Help Desk (soehelpdesk@nyu.edu, 646.997.3123)
NYU IT Service Desk (AskIT@nyu.edu, 212-998-3333)

Policies

Academic Misconduct

- A. Introduction: The School of Engineering encourages academic excellence in an environment that promotes honesty, integrity, and fairness, and students at the School of Engineering are expected to exhibit those qualities in their academic work. It is through the process of submitting their own work and receiving honest feedback on that work that students may progress academically. Any act of academic dishonesty is seen as an attack upon the School and will not be tolerated. Furthermore, those who breach the School's rules on academic integrity will be sanctioned under this Policy. Students are responsible for familiarizing themselves with the School's Policy on Academic Misconduct.
- B. Definition: Academic dishonesty may include misrepresentation, deception, dishonesty, or any act of falsification committed by a student to influence a grade or other academic evaluation. Academic dishonesty also includes intentionally damaging the academic work of others or assisting other students in acts of dishonesty. Common examples of academically dishonest behavior include, but are not limited to, the following:
 1. Cheating: intentionally using or attempting to use unauthorized notes, books, electronic media, or electronic communications in an exam; talking with fellow students or looking at another person's work during an exam; submitting work prepared in advance for an in-class examination; having someone take an exam for you or taking an exam for someone else; violating other rules governing the administration of examinations.
 2. Fabrication: including but not limited to, falsifying experimental data and/or citations.



3. Plagiarism: Intentionally or knowingly representing the words or ideas of another as one's own in any academic exercise; failure to attribute direct quotations, paraphrases, or borrowed facts or information.
4. Unauthorized collaboration: working together on work that was meant to be done individually.
5. Duplicating work: presenting for grading the same work for more than one project or in more than one class, unless express and prior permission have been received from the course instructor(s) or research adviser involved.
6. Forgery: altering any academic document, including, but not limited to, academic records, admissions materials, or medical excuses.

Disability Disclosure Statement

Academic accommodations are available for students with disabilities. Please contact the **Moses Center for Students with Disabilities** (212-998-4980 or mosescsd@nyu.edu) for further information. Students who are requesting academic accommodations are advised to reach out to the Moses Center as early as possible in the semester for assistance.

Inclusion Statement

The NYU Tandon School values an inclusive and equitable environment for all our students. I hope to foster a sense of community in this class and consider it a place where individuals of all backgrounds, beliefs, ethnicities, national origins, gender identities, sexual orientations, religious and political affiliations, and abilities will be treated with respect. It is my intent that all students' learning needs be addressed both in and out of class, and that the diversity that students bring to this class be viewed as a resource, strength and benefit. If this standard is not being upheld, please feel free to speak with me.