NYU TANDON SCHOOL OF ENGINEERING

Finance & Risk Engineering

FRE-GY 5030,
Winter Math Bootcamp

Instructor Information

- Nathan Saulduboi
- 1 Metrotech Center
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- Office hours : By Appointment

Course Information

- FRE-GY 5030
- Winter Math Bootcamp
- Mathematical Foundations for Finance and Risk Engineering
- All classes will be online.

Course Overview and Goals

The purpose of this Bootcamp is to provide you with the mathematical tools necessary to handle most of the quantitative concepts you will encounter during the program.
The topics covered in this Bootcamp are: Matrices, Differential Calculus, Optimization, and Probability.

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

- Manipulate matrices, solve linear systems, diagonalize matrices and see how it can be used.
- Handle main concepts of Differential and integral calculus in one and multiple dimensions.
- Handle optimization problems, with or without constraints.
- Understand fundamental concepts of probability theory and their direct applications. The goal is to understand how uncertainty is modeled mathematically and how probabilistic tools support portfolio analysis, pricing, and risk measurement.

Course Requirements

Class Participation

Except for the first session, which will be entirely dedicated to matrices, each lecture will consist of 1 hour and 30 minutes of exercise review (based on assignments given from one class to the next), followed by a 15-minute break, and then a 2-hour lecture.

Assignments

There will be no final exam for this refresher course, nor any graded homework assignments.

However, it is highly recommended that you complete the standard exercises between sessions as they will help you quickly assimilate the concepts studied during the lectures.

Course Schedule

Topics and Assignments

Week/Date	Topic
01/05/2026	Matrices
01/07/2026	Differential and Integral calculus.
01/09/2026	Optimization
01/12/2026	Probability : Basics and Random Variables
01/15/2026	Probability : Random Variables and Conditional Expectations
01/18/2026	Probability : Conditional Expectations and convergences of Random Variables

Course Materials

Advised Textbooks & Materials

- Robert Hogg and Allen Craig, Introduction to Mathematical Statistics
- J. Douglas Carroll and Paul E. Green, Mathematical Tools for Applied Multivariate Analysis
- Mathematics for Machine Learning, Marc Peter Deisenroth, A. Aldo Faisal, Cheng Soon Ong

Resources

- **Access your course materials**: NYU Brightspace
- **Databases, journal articles, and more**: Bern Dibner Library (library.nyu.edu)
  NYU Virtual Business Library (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.

Using Generative AI

Please refer to the Adapting Assignments to Generative AI page to craft a statement that is either Integrating, Avoiding, or Forbidding.