New Economic School

Masters in Finance MIF & Mini-MIF Programs

Preparatory course in Mathematics

February 4 - April 15, 2023

Course description and goals:

The main objective of this course is to provide students with the knowledge and skills necessary to take the GRE General exam or MIF Entrance exam. The emphasis will be made on solving problems with a brief outline of the main theoretical concepts.

The course consists of 10 online lectures, 3 hours each (with breaks), on Saturdays from 11:00-14:00. Depending on the progress the course instructor may increase/decrease the pace of the lecture by redistributing the content between lectures.

Plan

The content for each lecture can be found below:

Lecture 1:

- Properties and types of integers, such as divisibility, factorization (GCD and LCM), prime numbers, remainders and odd and even integers.
- Arithmetic operations, exponents and roots
- Operations with fractions, percent, ratio, rate, absolute value, the number line, decimal representation and sequences of numbers

Readings:

- "Math Review" for the Quantitative Reasoning section of the GRE General Test. Chapter 1.2–1.7

Lecture 2:

- Operations with exponents
- Factoring and simplifying algebraic expressions
- Functions
- Solving equations (linear and quadratic) and inequalities (linear)
- Solving simultaneous equations and inequalities
- Setting up equations to solve word problems

Readings:

- "Math Review" for the Quantitative Reasoning section of the GRE General Test. Chapter 2.1-2.7

Lecture 3:

- Derivatives
- Simple optimization with derivatives

Readings:

- Gilbert Strang and Edwin "Jed" Herman, "Calculus", Volume 1". Chapter 4.7.

Lecture 4:

- Basic descriptive statistics, such as mean, median, mode, range, standard deviation, interquartile range, quartiles and percentiles
- Interpretation of data in tables and graphs, such as line graphs, bar graphs, circle graphs, boxplots, scatterplots and frequency distributions

Readings:

- "Math Review" for the Quantitative Reasoning section of the GRE General Test. Chapter 4.1–4.2

Lecture 5:

- Counting methods
- Concept of probability

Readings:

- "Math Review" for the Quantitative Reasoning section of the GRE General Test. Chapter 4.3–4.4
- Sheldon Ross «A first course in probability». Chapter 1-2

Lecture 6:

- Conditional probability and Bayes' formula
- Random variables and distributions. Basic operations with expectation, variance, covariance

Readings:

- "Math Review" for the Quantitative Reasoning section of the GRE General Test. Chapter 4.5
- Sheldon Ross «A first course in probability». Chapter 3-4

Lecture 7:

- Continuous random variable. Uniform and Normal distribution
- Log-normal distribution and its properties
- Expectation and variance of continuous random variable

Readings:

- Sheldon Ross «A first course in probability». Chapter 5

Lecture 8:

- Introduction to linear regressions
- Basic hypothesis testing with linear regressions

Readings:

- Introductory Econometrics: A Modern. Approach, Fifth Edition. Jeffrey M. Wooldridge. Chapter 2-4

Lecture 9:

- Full review
- Solution of one past exam

Lecture 10:

- Solution of two past exams/olympiads (16 April 2022 and 18 June 2022)

Books:

1. "Math Review" for the Quantitative Reasoning measure of the GRE General Test - https://www.ets.org/content/dam/ets-org/pdfs/gre/gre-math-review.pdf

2. Sheldon Ross «A first course in probability» - http://www.seyedkalali.com/wp-content/uploads/2016/11/A-First-Course-in-Probability-8th-ed.-Sheldon-Ross.pdf

3. Introductory Econometrics: A Modern. Approach, Fifth Edition. Jeffrey M. Wooldridge - https://economics.ut.ac.ir/documents/3030266/14100645/Jeffrey_M._Wooldridge_Introductory_Econometrics_A_Modern_Approach__2012.pdf

4. Gilbert Strang and Edwin "Jed" Herman, "Calculus", Volume 1" - https://openstax.org/details/books/calculus-volume-1

Schedule (preliminary schedule that can change):

#	Date
Lecture 1	Saturday. February 4
Lecture 2	Saturday. February 11
Lecture 3	Saturday. February 18
Lecture 4	Saturday. February 25
Lecture 5	Saturday. March 4
Lecture 6	Saturday. March 11
Lecture 7	Saturday. March 18
Lecture 8	Saturday. March 25
Lecture 9	Saturday. April 1
MIF & MINI-MIF OLYMPIAD	Saturday. April 8
Lecture 10	Saturday. April 15

About instructor:

Ireko Zamilov graduated from NES MAE in 2020. Now he is doing a PhD degree at the London Business School. He specializes in finance and has work experience in a private equity fund.