MATH-UA 131 – 011 / 016 — MFE I

- **Term:** Fall 2023
- **Prerequisite:** SAT / AB / ... scores, Placement exam, or C or more in Precalculus
- **Instructor:** Raoul Normand
- **Email:** rjn5@nyu.edu
- **Office:** Warren Weaver Hall (WWH) 726
- **Office hours:** M 9:30 – 10:30, W 10:30 – 11:30, WWH 726
- **Lectures:** MW 8:00 – 9:15 AM, MEYR 121 (Sec 11)

  TR 8:00 – 9:15 AM, Silver 207 (Sec 16)
- **Recitations:** Fridays, register and check details on Albert

Course information

This is the first semester of a sequence designed to give you the intuition to think about economic ideas in mathematical terms and interpret mathematical concepts in the context of economics. Your understanding of economics and mathematics both will improve after this sequence.

Mathematics is increasingly important in terms of the expression and communication of ideas in economics. A thorough knowledge of mathematics is indispensable for understanding almost all fields of economics, including both applied and theoretical fields. In particular, understanding of elements of calculus and linear algebra are crucial to the study of economics, and this class is designed to provide such appropriate mathematical tools. The formal derivations of the mathematical concepts needed will be the heart of this class. Economic models can often be easily and precisely described in terms of mathematical notation, when words and graphs would fail or mislead us. Therefore, as applications of the mathematical concepts covered in class, examples and motivation will be drawn from important topics in economics.

Some key topics, roughly in order of their appearance in the course, include:

- notion of functions, classical functions;
- limits and continuity;
- derivatives and their interpretation; differentiation rules;
- inverse functions, exponential functions, logarithmic functions;
- linear approximation, elasticity;
- local and global extrema, higher-order derivatives, convexity;
- function of several variables, partial derivatives;
- optimization for functions of several variables.

Class material

Books

- *Essential Calculus: Early Transcendentals, 2nd ed.,* by James Stewart.
- *Essential Mathematics for Economic Analysis (4th or 5th ed.)*, Sydsaeter & al.

The course will mostly follow Stewart's book. Sydsaeter's book contains more applications to economics and is also recommended if you intend to follow up with MFE II.

The course will be self-contained and you are not required to obtain either textbook. It is still recommended that you get Stewart's book (in any way format that you desire) as you can use it as a reference and to get more details on the topics covered in class. MFE II and MFE III will also use Stewart's book.

Campuswire

Campuswire is an online forum. This is where you should ask any questions regarding the course. For personal questions, please do not send me an email, and instead DM me on Campuswire. I will periodically answer questions on Campuswire, but it should first and foremost remain your own platform. Campuswire is accessible through Brightspace.

Gradescope

Your homework will have to be scanned and submitted on Gradescope before the deadline. After it is graded, you will see your grade and the comments from the grader there. Gradescope is available through Brightspace. You will receive a link to register at the beginning of the term. Quizzes will also be administered through Gradescope.

Course organization

A typical week will consist of two lectures, one recitation, and one quiz. There will be one homework assignment every other week. Please see the schedule for details.

- We will meet twice every week for lectures.

- On Fridays, you will have a recitation with your TA to work on some exercises covering the topics of the current week.

- One quiz on these topics will be due on Gradescope on Monday. You can do the quiz any time on Monday, and you will have 20 minutes to complete it.

- A homework assignment will be due every other week. It will contain more advanced and conceptual questions, as well as applications to economics.

Grading policy

Your final grade will be calculated with the following weights.

- **Homework (15%).** The lowest grade will be dropped.

- **Attendance in recitation (5%).** Two absences are allowed. -1% for each subsequent absence, for any reason.

- **Quizzes (15%).** The two lowest grades are dropped (including missed assignments).

- **Midterm (15 – 25%).** See schedule.

- **Final exam (40 – 50%).** See schedule. The final will count for 50% if it is better than the midterm, 40% otherwise.

Your grade out of 100 will then be computed and translated into a letter grade according to the following cutoffs. These cutoffs *may* be adjusted to your advantage.

[93,100]	[90,93)	[87,90)	[83,87)	[80,83)	[75,80)	[65,75)	[50,65)	[0,50)
A	A-	B+	B	B-	C+	C	D	F

Class policies

Absences

Missing lectures or recitations will hinder your ability to keep up with the class. In exceptional circumstances when you need to miss a class, catch up asap using the notes and documents available in the Google drive.

There is no need to let your instructor or TA know of an absence, except if you miss the midterm or the final. In this case, you have to let your instructor know in advance. Absence will only be excused in case of illness, religious observation, family emergencies, or university-sanctioned events. If you miss the midterm, you will need to make up for it within a week. If you miss the final exam and are in good standing in the class, you will be given an Incomplete and will need to take the exam later (typically before the start of the next term).

Since you have two weeks to finish your homework, no delay will be accepted for any reason. Therefore, make sure to upload your work to Gradescope in advance. Having "technical issues" is not a justification for late work.

Please let your instructor know asap of any circumstance that would hinder your ability to keep up with the class for a significant amount of time so that we can discuss arrangements. Note also that drops are automatically applied, and you do not need to let your instructor know that you are "taking a drop". It is perfectly fine to miss an assignment to recuperate!

A student missing the final exam with no justification, five quizzes, or three homework assignments will receive an F.

What if I am feeling sick?

Please **stay home and follow NYU's guidelines**. The rules outlined in the previous paragraphs still apply, and you should let me know in advance if you cannot make it to an exam.

Please note that this is an in-person class. You cannot "opt-in" to take it online or remotely, and the lectures will not be available on Zoom.

Grade appeal

Assignments will be graded within a week. You then have until the end of the week to request a regrade. You should do so through the "Regrade request" feature on Gradescope. Before doing this, please make sure to read the solution carefully, and understand if your work was correct and complete. Typical reasons for losing points despite a correct answer are:

- no explanation was given;
- details of the computation were not written;
- the work was illegible or too dirty;
- part of a question was not answered.

Please keep in mind that grading mistakes can happen, but are rare, so the regrading feature should be used parsimoniously, and abuses will be punished.

Communication

Questions regarding the class should be asked publicly on Campuswire. However, please check beforehand that the answer is not already answered there, in the FAQ, or in the syllabus. To discuss personal matters, please send a DM on Campuswire. Please do not ask for exceptions or extensions since none will be granted. In any message that you send, please observe basic rules of respect and politeness, and allow a reasonable amount of time for an answer. You can call your instructor Prof. / Professor (Normand). Please ask your TAs how they would like to be addressed.

Calculators

Calculators are not allowed during quizzes, the midterm, or the final. For homework assignments, you may use a calculator or computational software to check your results, to perform tedious algebra (like adding fractions or a lot of numbers), or to compute approximations (e.g., logarithms or exponentials). However, all "calculus" computations (computing derivatives, integrals, etc.) and formal algebra should be done by hand, with all details shown. To know how much details you should show, follow this rule of thumb: between one line and the next one, you should be able to do all computations in your head.

Tests

No calculators, course notes, book, or any other documents are allowed during the midterm and the final. For quizzes, you can use your notes, the book, and any document provided (e.g., recitation papers, solutions, etc.), but nothing else: no calculator, computing software, AI, or any other type of assistance. Any suspicion of cheating will be investigated and punished.

Academic integrity

Students are expected to read and understand the university's policy on academic integrity as laid out in the College of Arts & Sciences Bulletin. Plagiarism and cheating will be penalized and reported. Collaboration is permitted, even encouraged, for home assignments; however, all submitted assignments must be written up independently and represent the student's own work and understanding.

Any suspicion of cheating on home assignments or in-class tests will be thoroughly investigated. If I suspect that a student cheated on an assessment, I may request a meeting where said student will be expected to work through a similar problem and / or explain their work verbally. If the student is unable to explain the work, or is not willing to meet, **they will get from a 0 on the assignment to a F in the class and be reported to their dean.**

Disability statement

New York University is committed to providing equal educational opportunity and participation for students with disabilities. It is the University's policy that no qualified student with a disability be excluded from participating in any University program or activity, denied the benefits of any University program or activity, or otherwise subjected to discrimination with regard to any University program or activity. The Henry and Lucy Moses Center for Student Accessibility (CSA) determines qualified disability status and assists students in obtaining appropriate accommodations and services. CSA operates according to an Independent Living Philosophy and strives in its policies and practices to empower each student to become as independent as possible. Our services are designed to encourage independence, backed by a strong system of support. Any student who needs a reasonable accommodation based on a qualified disability is required to register with the CSA for assistance.

MORE DETAILS

Schedule

A detailed schedule of all tests, deadlines, and topics covered is available in the Google Drive (link on Brightspace).

Asking questions

Office hours will be offered twice a week by your instructor and by each TA. You are strongly encouraged to attend office hours to ask any questions that you may have about the class content or to discuss personal questions**. Please ask questions about homework on Campuswire**, as it allows everyone to participate and see the replies. Take all the advantage that you can of office hours and Campuswire. Students who seek help routinely make dramatic progress.

Tutoring

The Courant Institute and the University Learning Center also provide free peer tutoring. Information and links are available on Brightspace.

HW guidelines

Academic integrity

You may consult your classmates or other resources (including NYU tutors) for ideas on the problems. The best way to get help is however to ask on Campuswire. The solutions that you turn in must nonetheless be written in your own words and reflect your own understanding. Your write-ups will be checked for textual similarities. You may not copy from, reword, or paraphrase another student's work or any other resource material; such conduct will be treated as a violation of academic integrity. Remember that you will not learn anything by simply copying, rewording, or paraphrasing another person's work. You will receive no credit for solely writing the final answer when explanation is necessary.

Homework instructions

The below homework specifications will be enforced. If the specifications are not respected, points might be deducted, or the homework assignment may not be accepted for grading. Each homework assignment that you upload and submit must:

- be labeled with your name (as on the roster) and your NetID (two or three letters plus a few digits, not your N number);

- be legible and have each problem clearly indicated;

- contain only your final version (write drafts on scratch paper);

- not have anything crossed out or contain notes in the margins;

- have solutions in which all steps are clearly shown and explained;

- contain grammatically correct and complete sentences, including punctuation and spelling;

- be written using correct mathematical terminology and notation;

- have final answers in exact forms (do not approximate unless otherwise stated);

- be uploaded in a single PDF file on Gradescope.

Gradescope instructions

If you never used Gradescope, please go to their website and watch the tutorial videos. An introductory video is also available on Brightspace. In all your written assignments, please abide by the following rules.

- Write your name (as on the roster) and NetID on the first page.

- Make a clean and clear scan of your assignments.

- Take photos in portrait mode.

- Turn all your photos in a single PDF file.

- When you upload this file, match each exercise with the corresponding pages.

It is very easy and quick to make nice scans with your phone and a dedicated app, e.g. Camscanner, Adobe Scan, or Office Lens. There is even a Gradescope that makes uploading your work very easy!

Quizzes

A quiz will cover the material seen in the lectures and the recitation of the previous week, so it is extremely important that you work thoroughly through the examples done in class and in recitation before starting the quiz. Even though you can use class documents, you should be able to do the exercises without notes since this is what you will have to do on the (much more important) midterm and final exams.

Advice

Weekly practice

The only material that you are expected to know is what is covered in the lectures, recitations, and homework. Keep in mind that whenever you study, you have to study actively, with a pen and a (large) piece of paper. Listening in class and reading your notes

is not enough, even if you feel like you fully understand. **Math is all about practice.** Here are some suggestions on how to study effectively.

- After class, review your notes, and summarize the important points and formulas (aim for 1 – 2 pages per lecture).

- Redo the exercises covered in class. Once again, even if you understood perfectly while your instructor worked through the examples, it does not mean that you can redo it on your own. Therefore, make sure to test yourself: you should be able to redo these exercises perfectly without looking at your notes. Exercises given in tests will be similar to the ones done in class, recitations, or homework.

- Attend recitation and work earnestly on the exercise sheets. Ask questions to your TA and listen to their advice. Afterwards, compare your work to the solution and complete all the exercises. Ask in office hours or on Campuswire if you have any questions.

- Once you are done, you should feel comfortable with the concepts of the week and most of the techniques. Afterwards, you can get started on the homework and do the quiz on Monday (keep your notes handy but try not to rely on them). Homework is more challenging, so you may need time or hints to finish it. Do not get stuck on an exercise for a long time (more than 10 or 15 minutes). Instead, move on and come back to it later, or ask for pointers on Campuswire. Do your homework little by little, not all at the last minute!

The course is very linear and interconnected, so it matters a lot not to fall behind, and misunderstanding a concept will hurt you more and more down the line.

Understanding your grades

Thorough solutions to every test and homework will be available online. When you receive your grade, check your assignment, read the solution carefully, and understand your mistakes. **It is extremely important to redo the questions that you did not answer properly.** If you made a mistake once, it is very likely that you will make it again, even if you understood the issue. Bad habits die hard!

Writing good mathematics

One point of the course is to teach you to write clear mathematics, do quick and correct computations, and present well-justified arguments. Therefore, except explicitly indicated (e.g., multiple-choice questions), **you should always show your work and explain what you are doing.** Copy the template of the examples done in class and in the typed-up solutions.

Writing good math is a careful job that takes effort to improve, but which is extremely beneficial: presenting well-constructed arguments in a clean and concise manner will not only help you understand the concepts better and make fewer mistakes, but it will also be a valuable skill in virtually any line of work. For this reason, whenever you do an exercise, write everything down cleanly, without using shortcuts, on a new sheet of paper. This will help you memorize the material but will also dramatically decrease the likelihood of an error.

About your instructor

I (RN) am a clinical assistant professor at NYU. "Clinical" has nothing to do with medicine and means that my main job is teaching. From 2016 to 2019, I was a visiting assistant professor at NYU Shanghai, and spent three years in Taiwan before. My native language is French, and I have slowly been picking up Mandarin Chinese, so talk to me and help me improve! I might still understand some German and Spanish, but do not count on it.

Recently, I have been picking up Python and studying some machine learning techniques. Come have a chat if you are interested in this.