# ECO10002: Mathematical Methods for Economics and Business

Marian Melnyk

Spring, 2024

Instructor: Marian Melnyk (he/him)
Class Hours: Mo 9:30AM - 10:45AM
Office Hours: Mo 10:50AM - 12:00PM
Class Room: NAC 5/110

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## Course Description

This course follows a hybrid asynchronous format. In-person lectures and office hours are held every Monday. In addition to these sessions, you will receive self-study materials each week, equivalent in content to one lecture. It is essential that you thoroughly learn and understand these materials during the week, prior to the next Monday's lecture. In this format, you bear a significant amount of responsibility. You are expected to manage your time efficiently, direct your own learning, independently engage with the materials, communicate proactively with instructors or peers when needed, and adapt to the necessary technology. This self-directed approach is crucial for your success in the course and will also aid in developing valuable lifelong skills such as self-discipline and effective time management.

The course will provide the student with a clear exposition of the essential mathematical tools and techniques that are frequently used to solve problems arising in economics. The course will be delivered by traditional "chalk and talk" lectures, and supplemented with regular take-home assignments and in-class quizzes. It covers the topics of college algebra and calculus. Specifically, the topics covered include: Functions, Differentiation, Limits, Integration, Multivariable Functions, etc.

## Prerequisites/Role in Curriculum

Prerequisites/Role in Curriculum: Economics and Management majors are required to complete math up through one semester of Calculus. This course may be taken in lieu of Precalculus (Math 195) and Calculus (Math 201 or 205) in satisfaction of the Department requirement. College Algebra (Math 190 or placement) at CCNY, or equivalent) is the course prerequisite. It is recommended that students take this course as soon as possible when they begin coursework

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toward an Economics or Management major, as it will be a prerequisite for all courses about the 100-level.

## Required Materials

1. Required: Sydsæter and Hammond ("S&H"), Essential Mathematics for Economic Analysis, 6th Edition

## Recommended Materials

1. Rosser and Lis, Basic Mathematics for Economists, 3rd Edition. (This book offers a treatment of basic topics, including algebra and graphs, which are not the focus of this course, in addition to precalculus and calculus. Students who feel a little shaky in these basic topics would benefit from having this additional textbook.)

### OER Materials

Open Educational Resources (OER) are teaching, learning, and research materials that are either (a) in the public domain or (b) licensed in a manner that provides everyone with free and perpetual permission to engage in the 5R activities – retaining, remixing, revising, reusing and redistributing the resources.[Link]

1. College Algebra by Carl Stitz and Jeff Zeager (Link)

    (a) College Algebra on myOpenMath

2. Applied Calculus, by Shana Calaway, Dale Hoffman, and David Lippman (Link)

    (a) Applied Calculus on myOpenMath

3. Business Calculus, by Shana Calaway

    (a) Business Calculus on myOpenMath

4. H. Jerome Keisler, Elementary Calculus. An Infinitesimal Approach, 2nd (Link)

5. Jim Fowler and Bart Snapp, Calculus One (Link)

## Additional Materials

This section contains various useful materials you are free (and encouraged) to use when preparing for the classes. Mainly we will go through the topics of college algebra and calculus. You can find the following video material extremely useful to catch up, refresh, and boost your understanding of Math. This is a great way to develop your intuition of Math. Besides, they are completely free.

- Khan Academy: College Algebra (Link)

- Khan Academy: College Calculus AB (Link)

- Khan Academy: Multivariable Calculus (Link)

- Jim Fowler, Calculus One Online Course (Link)

- Grant Sanderson (3Blue1Brown), Calculus (Link)

## Learning Objectives

1. Define and use basic algebraic concepts.

2. Understand the definition of a function and its properties.

3. Understand the concept of limits and their applications.

4. Solve optimization problems using single-variable calculus.

5. Integrate functions using simple and advanced rules.

6. Understand the concept and application of functions of many variables in economics.

7. Review and apply mathematical tools learned throughout the course in a variety of economic contexts.

## Why do we learn Math at all?

In order to:

1. read and comprehend economic literature

2. think like an economist

3. understand, evaluate and develop economic and business theories

4. be able to critically assess economic theory

5. to communicate your ideas clearly and concisely

6. organize quantitative data and highlight structure

7. analyze data, identify trends and make predictions

8. see the logical implication of assumptions and discover contradictions

9. more and more reasons

# Grading

I reserve the right to curve the scale dependent on overall class scores at the end of the semester. Any curve will only ever make it easier to obtain a certain letter grade. The grade will count the assessments using the following proportions:

- **20%** Midterm I

- **20%** Midterm II

- **30%** Final Exam

- **10%** Quizzes

- **20%** Homework Assignments

Two quizzes with the lowest grade will be dropped. One homework with the lowest grade will be dropped too.

Final grades will be assigned according to the following scale:

| A  | $93 - 100$ | C+ | $77 - 79$ |
|----|-----------|----|-----------|
| A− | $90 - 92$  | C  | $73 - 76$ |
| B+ | $87 - 89$  | C− | $70 - 72$ |
| B  | $83 - 86$  | D  | $60 - 69$ |
| B− | $80 - 82$  | F  | $0 - 59$  |

# Math Study Tips

The purpose of this short section is to provide you with some tips on how to study math and succeed in this course.

1. Practice, practice, and practice

2. Study outside of class regularly

3. Take notes during the class

4. Do all the homework assignments

5. Summarize and systematize the studied material

6. Review the studied material

7. Set aside time for study and do it in a calm, quiet environment

8. Use AI as an assistant and tutor

# Homework Assignments

You will have homework assignments pretty much every week. The homework assignments will be posted on Blackboard. Usually, you will have to submit your work online before Monday's class. Please, write everything diligently and clearly. You can lose points if parts of your work are unreadable. Include all the necessary steps, maintain strict delineation, and highlight the main points, especially your final answer.

Assignments submitted late will not incur a penalty if a valid excuse is communicated to the instructor before the deadline. If submitted after the deadline without prior communication of a valid excuse, assignments will be accepted but with a 50% deduction from the total score. If an assignment is submitted after the solutions have been posted, it will receive 0 points.

# Schedule and weekly learning goals

The schedule is tentative and subject to change. The topics below should be viewed as your goals to understand these topics and grasp the related concepts. Thus, it is also a study guide before each exam and at the end of the semester. The topics in the second and third parts of the semester build on the concepts in the first part of the semester, though, so it is essential to review those concepts throughout the semester. The Final exam will be cumulative.

Please note that all of the topics are covered in the recommended materials too.

**Week 01, 01/29 - 02/05:**   Introduction/Review of Algebra

- Why Math? [Video]

- Chapters in S&H: 1,2

**Week 02, 02/05 - 02/12:**   Functions

- Chapters in S&H: 4, 5

- What is a function? Video

**Week 03, 02/12 - 02/19:**   Introduction to Differentiation

- Chapters in S&H: 6.1-6.4

**Week 04, 02/19 - 02/26:**   Limits, Simple Differentiation Rules

- Chapters in S&H: 6.5-6.7

- Limits intro: Article and video

**Week 05, 02/26 - 03/04:**   **Midterm Exam 1 (on weeks 1-4)**

- Chapters in S&H: 1,2

**Week 06, 03/04 - 03/11:**   Chain Rule, Advanced Differentiation Topics

- Chapters in S&H: 6.8-6.11

**Week 7, 03/11 - 03/18:**   Single-Variable Optimization - I

- Chapters in S&H: 8.1-8.4

**Week 8, 03/18 - 03/25:**   Single-Variable Optimization - II

- Chapters in S&H: 8.5-8.8

**Week 9, 03/25 - 04/01:**   Integration - I

- Chapters in S&H: 9.1-9.3

**Week 10, 04/01 - 04/08:**   Integration - II

- Chapters in S&H: 9.4-9.6

**Week 11, 04/08 - 04/15:**   **Midterm Exam 1 (on weeks 6-10)**

**Week 12, 04/15 - 04/22:**   Functions of Many Variables - I

- Chapters in S&H: 11.1-11.3

**Week 13, 04/22 - 04/29:**   Spring Recess

**Week 14, 04/29 - 05/06:**   Functions of Many Variables - II

- Chapters in S&H: 11.4-11.6
- Functions of Many Variables - I [Video]

**Week 15, 05/06 - 05/13:**   Functions of Many Variables - III

**Week 16, 05/13 - 05/20:**   Catch-Up and Review

# Course Policies

## During Class

During class, you can use tablets, Kindle Scribe, or similar recording devices. No need to use laptops or phone except for the specified cases. Eating and drinking are allowed in class, but please refrain from it affecting the course. Try not to eat your lunch in class.

## Attendance Policy

For complete attendance and excused absence policies, please see Policy on Lateness and Absence. Attendance is expected in all lectures. Valid excuses for absence will be accepted before class. Anyway, even if you miss a class and a respective quiz, you have 2 quiz grades dropped.

## Policies on Incomplete Grades

A grade of incomplete (INC) may be given by an instructor to a student who, through unavoidable circumstances, has been unable to complete the assigned coursework. Coursework must be completed no later than the date published in each semester's academic calendar (e.g., a student who receives an INC for a course ending in May must complete the work by mid-march of the following year). A grade of INC not resolved in a timely manner will become an FIN. Extensions of time for resolving FIN grades may be considered only by written appeal to the appropriate Committee on Course and Standing of the particular school.

## Late Assignments

Assignments submitted late will not incur a penalty if a valid excuse is communicated to the instructor before the deadline. If submitted after the deadline without prior communication of a valid excuse, assignments will be accepted but with a 50% deduction from the total score. If an assignment is submitted after the solutions have been posted, it will receive 0 points.

# CUNY Policies and Resources

## Academic Integrity and Honesty

Students are required to comply with the university policy on academic integrity found in the Code of Student Conduct found at http://policies.ncsu.edu/policy/pol-11-35-01. Don't cheat. Don't be that guy. Yes, you. You know exactly what I'm talking about. See http://policies.ncsu.edu/policy/pol-11-35-01 for a detailed explanation of academic honesty.

## Accommodations for Students with Disabilities

The AccessAbility Center/Student Disability Services ensures equal access and full participation to all of City College's programs, services, and activities by coordinating and implementing appropriate accommodations. If you believe you may need an accommodation, please do get in touch with the AAC/SDS (link). You can reach the AccessAbility office via email (disabilityservices@ccny.cuny.edu) or through their Zoom virtual front desk (link)

Please let your other professors know if you have registered with the AccessAbility Center/Student Disability Services (AAC/SDS) or have any special needs, learning differences, or medical conditions that may affect your coursework so that we can make the appropriate accommodations.

Early planning is essential for many of the resources, adjustments and accommodations; students are asked to contact SDS at the earliest possible date.

## CUNY Policy on Academic Integrity

Plagiarism is the act of presenting another person's ideas, research or writings as your own. The following are some examples of plagiarism:

- Copying another person's actual words without the use of quotation marks and footnotes attributing the words to their source;
- Presenting another person's ideas or theories in your own words without acknowledging the source;
- Using information that is not common knowledge without acknowledging the source;
- Failing to acknowledge collaborators on homework and laboratory assignments.
- Internet plagiarism includes submitting downloaded term papers or parts of term papers, paraphrasing or copying information from the internet without citing the source, and "cutting & pasting" from various sources without proper attribution."
- A student who plagiarizes may incur academic and disciplinary penalties, including failing grades, suspensions, and expulsion.
- A complete copy of the CUNY Policy on Academic Integrity may be downloaded from the College's home page.

## Emergency Grants

The Colin Powell School has Emergency Grants for students impacted by Covid-19 pandemic and quarantine. If you need help and/or funds, please contact Ms Charlene Darbassie cdarbassie@ccny.cuny.edu

## IT Needs

If you need a computer, tablet, or wi-fi, you can request them through an (online form). You can also contact the iMedia Center via email (imedia@ccny.cuny.edu) or their Zoom virtual front desk, Monday-Thursday, 11am-3pm, (link).

## ETutoring/Academic Support

If you are struggling in any of your classes, don't hesitate to get extra academic support. There are various student tutoring services through CCNY Tutoring Services (https://www.ccny.cuny.edu/academics/tutoring) or City Tutors (https://www.thecitytutors.org/). The Colin Powell School also offers free peer mentoring with trained upperclassman students to help motivate, focus on academics, and support students in achieving their goals. To sign up, simply fill out the form (https://airtable.com/appbIX4GFdKGDMLwL/shrWHKbV8QKh3017A). Learn more through the Colin Powell Office of Student Success Mentoring (https://cps-oss.ccny.cuny.edu/mentoring/).

The CCNY Writing Center (www.ccny.cuny.edu/writing) offers individualized **writing support** to all students.

## Advising

Contact the Colin Powell School Advising Office (link). At their website, you can make a virtual appointment with one of the advisors or you can find their email addresses so you can send them a message.

## Internships and Careers

To receive information and support about securing internships and planning for your post-college career, please contact Debbie Cheng (dcheng@ccny.cuny.edu), Ashif Hassan (ahassan@ccny.cuny.edu), and Maya Gutierrez (mgutierrez1@ccny.cuny.edu) in the Colin Powell School Office of Student Success (link). Also, take a look at the new Career Handbook to help you start thinking about career and professional development (link). City College also offers assistance with internships and jobs through the College's Career & Professional Development Institute (link).

A wide variety of student support resources—from mentoring to fellowships, from activist and leadership skills to career planning—is available at the Colin Powell School Office of Student Success. Check out their new website (https://cps-oss.ccny.cuny.edu/). Make sure to stop by their offices on the 6th floor of the NAC.

## Mental Health

If, for any reason, you are struggling with personal issues, anxiety, depression, or stress, there are a number of resources on campus.

The Student Counseling Center in the Health and Wellness Center provides remote counseling that is free and confidential to students. You can contact them via phone (212-650-8222) or email (counseling@ccny.cuny.edu). To be immediately connected with a Crisis Counselor, text CUNY to 741741. This Crisis Text Line is a free and confidential service that assists in problem solving and safety planning during moments of crisis and is available 24 hours a day, seven days a week. They also have links to a number of resources on their website (https://www.ccny.cuny.edu/counseling).

The Psychological Center, located in the NAC Building, 8th Floor offers a range of in-person psychological services at low cost, including individual and group psychotherapy, couple's therapy, and psychological testing. All services are confidential. To schedule a psychological screening, please call 212-650-6602 or you can go on the clinic's website https://www.thepsychologicalcenter.org/ and click on "NEW PATIENT" to begin the process for a psychological screening.

The Colin Powell School also has a new partnership with NAMI-NYC to help you if you are living with mental health challenges or if you care about someone experiencing those challenges. NAMI-NYC programs are services are available FREE of charge and you can be as anonymous as you'd like. Contact NAMI-NYC's helpline via phone (212-684-3264) or email (helpline@naminyc.org).

## Student Basic Needs

If you are dealing with food insecurity, please visit Benny's Food Pantry (link) in the Hoffman Lounge on the first floor of the NAC. To gain access on weekdays, just make an appointment online (link).

If you are facing an emergency shortage of funds, please email Ms. Charlene Darbassie (cdarbassie@ccny.cuny.edu) or Dean Andy Rich (arich@ccny.cuny.edu) in the Colin Powell School Dean's Office. They will tell you how to apply for an emergency grant. Applying is quick and easy. You can learn more about these emergency grants online (https://www.ccny.cuny.edu/colinpowellschool/student-emergency-fund).

## Policies on Non-Discrimination and Sexual Harassment

The City College prohibits discrimination on the basis of age, gender, sexual orientation, transgender, disability, genetic predisposition or carrier status, alienage or citizenship, religion, race, color, nationality or ethnic origin, or veteran, military or marital status in its student admissions, employment, access to programs, and administration of educational policies. Questions, concerns, or complaints based on any of the above may be directed to the Office of Diversity and Compliance, Wille Administration Building, Room 212 (212-650-6310). In addition, the specific form of gender discrimination, "sexual harassment," is prohibited by the policies of the Board of Trustees of The City University of New York. Student complaints alleging sexual harassment should be directed to the Sexual Harassment Awareness and Intake Coordinator (see Appendix B.15 of the Bulletin, and the Sexual Harassment brochure for the name of the current Coordinator and a list of Committee members who may be contacted). Brochures are available in the Office of Diversity and Compliance, the Office of Human Resources, the Office of the Vice President for Student Affairs and at the NAC Welcome Center. Information is also available on the City College website under Office of Diversity.

If you are experiencing or have experienced domestic violence or violence that is sex-based, gender-based, or sexuality-based; or if you are experiencing or have experienced discrimination because of gender, sex, sexuality, race, ethnicity, language, religion, disability, or other reasons, please report it to Sheryl Konigsberg in the Office of Affirmative Action, Compliance, and Diversity (https://www.ccny.cuny.edu/affirmativeaction) via email (skonigsberg@ccny.cuny.edu), phone (212-650-6310), or in-person (Shepard Hall 109 A-D). For a confidential discussion of these and related issues, please contact Sophie English via email (senglish@ccny.cuny.edu) or phone (212-650-8905).

The Health and Wellness Center offers resources to survivors of gender-based and sexuality-based violence as well as to all members of the LGBTQIA+ community at CCNY. You can learn more about these resources online (https://www.ccny.cuny.edu/health-wellness/gender-resources) or via phone (212-650-8222), via email (genderresources@ccny.cuny.edu), or in person at the Safe Space Resource Room located in the LGBTQ+ Student Center (https://www.ccny.cuny.edu/lgbtq-student-center) in NAC 1/101B.

## Policy on Children in Class

All students should assist in welcoming their peers who are parents. Breastfeeding babies and newborns welcome always. For older children, I understand that unforeseen disruptions in childcare can be an issue, so you are welcome to bring your child to class – although this is not a long-term solution.

## Veterans

If you are a veteran, please know that the Office of Veteran Affairs offers a wide range of resources to support your studies. Information for how to contact that office is on the website (https://www.ccny.cuny.edu/veterans/veterans-affairs-city-college).

## Immigration

If you have any questions or concerns about your immigration status or that of your family members, please consult the CCNY Immigration Center (https://www.ccny.cuny.edu/we-are-one-ccny/city-college-immigration-center) for free and confidential advice via phone (212-650-6620) or email (meetu.dhar@cuny.edu).

## Other

For general advising questions, contact the Colin Powell School Office of Academic Advisors (link). This office is located in the NAC Building, Room 6/293. At their website, you can use Navigate to make an appointment with one of the advisors (https://ccny-cuny.campus.eab.com/). You can also find their email addresses so you can send them a message.