
ECON 1078-001

Mathematical Tools for Economists 1

August 21 - December 5

Instructor information

Instructor: Dr. Sidonia McKenzie
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Course information

Lecture times: MWF; 9:05 - 9:55 am
Lecture room: ECON 117
Prerequisite(s): [Be excited!](#) 😊

From the Flatirons to the Classroom – Welcome, Buffs!

Thank you for enrolling in this fun and practical foundation-level course!

Course Description

This is a one-semester course on the mathematical tools most frequently used by economists. The course is designed to build skills gradually, ensuring a smooth transition into more advanced economics and business classes. We will begin with foundational topics such as algebra, equations (linear and non-linear), and functions and their graphs. From there, we will move into systems of equations, set theory, summation, logic, and introductory proofs. Along the way, we will emphasize not only how to solve problems, but also why these tools matter for economic analysis. By the end of the semester, you will have developed a strong mathematical foundation that will support your success in upper-level coursework and provide confidence in applying quantitative reasoning to real-world economic questions.

Note that hyperlinks are embedded throughout this document. Please click on the words in [this color](#) to access email links, documents, and web pages.

Objectives

The course's primary objectives are to help you:

1. ***Cultivate quantitative reasoning and problem-solving.*** Apply algebra, functions, and logical reasoning to solve novel problems, and evaluate how mathematical tools provide insight into economic analysis.
2. ***Enhance your ability to communicate mathematical and economic ideas effectively.*** Demonstrate your understanding through clear explanations, well-structured solutions, and respectful engagement in discussions with peers and instructors.
3. ***Foster a collaborative learning community.*** Work with classmates to tackle challenging problems, support one another's growth, and develop confidence in using mathematics as a language for economics.

Required Textbook & resources

Knut Sydsaeter, Peter Hammond, and Arne Strom, *Essential Mathematics for Economic Analysis*, 6th Edition.

Note: You may use an alternative edition of the textbook—just make sure to match up the relevant chapters, sections, and page numbers with what's listed in the syllabus.

Course Assessments

The tentative course schedule lists the class assessments (targets) you will work towards achieving. The respective weights are discussed on [page 4](#). The assessments are also structured to reinforce a class culture that promotes fairness, collaboration, and group-level knowledge sharing. Further details about this will be provided in lectures.

- Midterm Exam 1 (20%)
 - Friday, October 3 at 9:05 am.
- Midterm Exam 2 (20%)
 - Friday, November 14 at 9:05 am.
- Attendance & Class participation (10%)
 - This component has proven crucial in marginal cases, sometimes differentiating an A- from B+.
- 4 Assignments (20%)
 - Usually due on Fridays at 9 pm.
- 4 Canvas Quizzes (10%)
 - (Highest 3 out of 4 will be recorded)
- Comprehensive Final Exam (20%)
 - **Wednesday, December 10 from 7:30 – 10:00 PM.** Please verify the date and time for yourself using the [Fall 2025 Final Examination Schedule](#).

Grade, Exams, & Assignments policies

I strictly adhere to the Department's grading policy, where a curve *may be* applied to determine your overall grade. In other words, if applicable, the curve is usually computed when all problem sets, quizzes, and exam scores have been tallied *but can be applied after any exam during the semester*. The Economics department determines the curve, so **the instructor has absolutely no input about this grade distribution**.

The historical average grade across all 1000-level Econ courses corresponds to a B-.

The **nominal grade cutoffs** presented below *may be utilized* to calculate overall grades in this course. If these percentages are not achieved in a particular exam, percentiles based on the department's curve will be applied to attain these cutoffs. In simpler terms, grades will be determined relative to the class average. For instance, a student scoring above the class average will receive a grade higher than this average, while a student scoring below will be awarded a grade lower than the class's average grade. **Following Midterms 1 and 2, we will provide you with relevant statistics for scores within the 25th to 95th percentiles, along with the corresponding letter grades (A, B, C, etc.).**

- | | |
|---|---------------------|
| • A → $\geq 93\%$ [or $\geq 90^{\text{th}}$ percentile] | • C → 73% – 76.99% |
| • A- → 90% – 92.99% | • C- → 70% – 72.99% |
| • B+ → 87% – 89.99% | • D+ → 67% – 69.99% |
| • B → 83% – 86.99% | • D → 63% – 66.99% |
| • B- → 80% – 82.99% | • D- → 60% – 62.99% |
| • C+ → 77% – 79.99% | • F → $< 60\%$ |

Exam modality & locations: All midterms and the final exam are administered in person in our classroom. **For students with testing accommodations, you must register your academic accommodation with Disability Services.** If it is determined that your exams should be taken in the Testing Center, we will follow the established process for scheduling exams through Student Testing Center.

Requests for re-grading: Regrade requests must be submitted to me in writing up to one week after your work is returned. Your written explanation should address legitimate concerns such as mistakes or oversight. Please do not approach me or the TA with an oral request before making the written request.

Exam content

ECON 1078 is a college-level class, and exams are designed to assess not just memorization, but your ability to apply mathematical concepts to problem-solving in economics. This means you will need to demonstrate mastery of algebra, functions, equations, and other tools by using them in new contexts.

While the general structure of questions will remain consistent, each exam will look different and may include variations or problem types you have not seen before, as I design multiple ways to test your level of understanding.

Therefore, do not expect to succeed by simply memorizing solutions from past exams, practice problems, or worksheets. Strong preparation comes from practicing the methods, understanding why each technique works, and being ready to apply them flexibly to new problems.



Responsibility

As the instructor of the course, I take responsibility for providing timely and consistent uploads of the relevant course content and resources that will facilitate the achievement of the course objectives. I am committed to a fair, equitable, and transparent grading process to help you achieve mastery of the course content and motivate you. To this end, I will maintain a flexible schedule to provide academic assistance and adjust, where feasible, to the vicissitudes of life.

I reserve the right to resolve any remaining ambiguities and revise the course schedule and other pertinent aspects of the course as needed.

You are responsible for taking the initiative to participate in all aspects of the course that will enable your successful completion. This is not a self-paced course! You have to complete the weekly readings and problem sets and study for the quizzes and exams. If you are looking for a class you can visit for a few minutes each week, read chapters at the last second, and still pull an A or Pass, then this class is *definitely not it*. However, if you are looking for a course that helps you gain a deeper understanding of how people interact and manage their scarce resources across various facets, then this is that course and so much more! If you put in the effort, I think your hard work will pay off, and you will leave the class knowing way more than you did coming in. This can be a really rewarding class! We all have to make decisions at one point; the materials taught in this course can help you beyond your university life by exposing you to tools that will help you make sense of this complex world.

Contract

A **syllabus is a contract** between students and the instructor that provides information about the course and provides a commitment device to prevent arbitrary behavior. By enrolling in this course, it is assumed that you are familiar with and agree to all policies outlined in this contract. **Should you find that these terms are not suitable for any reason, you have several options to opt out of this agreement.** These include **dropping the course by September 5 or petitioning for a course withdrawal by October 22.**

The policies and content outlined in this syllabus are subject to change at the instructor's discretion. If new guidelines are issued by the Provost after the semester begins and they supersede course policies, the syllabus will be updated accordingly. Any changes will be communicated clearly to students.

Success tips: Frequently asked questions and answers

Q: What are your basic expectations for the class?

A: **Professional conduct is always expected, regardless of the mode of delivery.** I expect that you will arrive at lectures on time, participate in and be respectful towards each others' views during class discussions. We are part of a respectful college community, so comments and language should be appropriate for this setting, including addressing your instructor appropriately (Professor or Professor McKenzie). Tolerance and respect towards each other must always be displayed. We all come from various backgrounds and bring different viewpoints and experiences to this community, which means that we have so much to learn from each other. We can show respect for differences by seeking to understand, asking questions, clarifying our understanding, and/or respectfully explaining our own perspectives. This way, everyone walks away with a new perspective of seeing an issue and respecting others with different values or beliefs.

I firmly adhere to the University's policy on [institutional equity](#). Our classroom is a safe space where students from different backgrounds can connect around the common goal of learning and applying economic concepts to create a measurable impact on our lives and those around us.

I hope you will dedicate at least two lecture sessions this semester to focused study and assignment completion. Beyond our regular class meetings, you should plan to spend about five hours each week on this course (attending office hours counts toward that time!). I encourage you to challenge yourself and, just as importantly, to enjoy the process. This can be a truly rewarding class. At some point, we all face decisions that require clear reasoning and careful analysis—the tools you will learn here can support you not only in your university studies but also in making sense of the dynamic and complex world beyond.

Q: I'm anxious about taking Math for the first time. What is your approach to teaching and expectations for the course?

A: Firstly, breathe. You are attending a highly selective school, so you have already proved that there is nothing you can't overcome. *Kudos to you!* ☺

I try to create a multi-media, experiential learning environment for students to engage with the course content in various ways. The first point of contact is the course's [Canvas page](#). I've devoted a significant amount of time to curating the lecture materials seamlessly to enhance your learning. You should automatically receive access to the Canvas page when you register for the course. The lecture slides, articles, videos, assessments, and class worksheets will be posted on our Canvas page. Please make every effort to familiarize yourself with the Canvas page. Every week, you should expect:

- Posting of lecture content based on the topic schedule.
- High-energy, sometimes fast-paced, in-person lectures on MWF from 9:05 am to 9:55 am. The time will fly by, so it's best to ***read ahead before each lecture***—that way you'll get the most out of our time together and be ready to engage with the material.
- a short assignment or course reflection to complete. These will be due at the beginning of the following class and often serve as our ice-breaker activity. Completing them is also a reliable way to earn participation points while reinforcing the material. For example, "*What was the most challenging concept from today's class, and how would you explain it to a peer?*"

Please note that on days we have exams, we will not have lectures.

Q: I'm anxious about my performance in an exam. How soon will grades be posted?

A: The [grade book](#) in Canvas will be updated regularly (almost weekly, if possible) so that you are aware of your current progress in the course and can make informed decisions about your continuation. This is done to promote transparency and accountability, which should prompt you to take action and seek academic help if you are not pleased with your current performance. Please take advantage of my student hours (they're for your benefit!), or reach out via email to schedule an appointment.

Q: How does the grading work?

A: A central theme in my pedagogical approach is to create an equitable class environment where everyone can work toward achieving their desired grade outcome. To this end, grade weights are applied to the course assessments, which give you the maximum return on your effort. That is, **your instructor will calculate your final grade in the course based on whichever method (A, B, C) yields the highest total score**. Following departmental recommendations, **a curve *may be* after this or at any point during the quarter**. Each method is calculated as follows:

- **Method A:** $40\% \times (\text{Assignments, Quizzes \& Attendance/Participation}) + 20\% \times (\text{Midterm 1}) + 20\% \times (\text{Midterm 2}) + 20\% \times (\text{Final Exam})$
- **Method B:** $40\% \times (\text{Assignments, Quizzes \& Attendance/Participation}) + 5\% \times (\text{Midterm 1}) + 25\% \times (\text{Midterm 2}) + 30\% \times (\text{Final Exam})$
- **Method C:** $40\% \times (\text{Assignments, Quizzes \& Attendance/Participation}) + 25\% \times (\text{Midterm 1}) + 5\% \times (\text{Midterm 2}) + 30\% \times (\text{Final Exam})$

Due to the structure of the course, **you must take both midterms and the final exam to receive an overall score in your Buff Portal**. Exams will not be rescheduled for any reason unless apocalyptic. Exams will not be rescheduled if you miss one. Notice the liberal grading policy, which allows several wild cards for most assessment categories. For example, the highest 3 out of 4 quizzes will be recorded. Please use these cards wisely. **If you already foresee an issue with the midterm and final exam dates, you should take the class in a different semester**. The Department of Economics offers Econ 1078 every term, including the summer.

You can opt for a Pass/Fail option (see further details on your grading options [here](#)). If you select this option, **to pass the class, you will need to score 70% (C) or better on each component of the course assessment**.

Q: What do you mean by a “curve” and why does it seem so ambiguous?

A: A curve, more formally grading on a curve, means adjusting students’ scores after an exam based on a predetermined distribution, usually a bell curve (see the illustration below). The Department of Economics determines this distribution to mitigate the vicious cycle of [grade inflation](#), which has permeated higher education. Though this practice is evidently contentious, in the words of renowned Economist Thomas Sowell, “there are no solutions, only trade-offs”.

To understand grade curving in the context of this class, it is best to consider your “*real grade*” (r), that is, the nominal grade (i) adjusted for grade inflation or a measure of your performance relative to the class (π). Conceptually, this is the Fisher equation applied to grading. That is,

$$r = i - \pi$$

where π can be negative or zero. In very rare cases, π could be positive. The ambiguity of grading on a curve is that π is unknown and difficult to predict *ex-ante*. ***In this course, π is determined after all exams have been graded, the measures of central tendency for the class are derived, and the department’s grade distribution is considered.***



Q: I hear that Midterm 2 is “harder” than Midterm 1. Can I just bomb Midterm 2 and settle for Method C?

A: The course is designed to use earlier topics as instructional scaffolding to help students connect class concepts to current economic events and policy. Naturally, the depth and breadth of learning and engagement increase each week. However, the level of difficulty is uniform across exams. **For the current version of this course, the assumption that Midterm 2 is harder is grossly misconstrued.** You are essentially betting against yourself to intentionally underperform in this exam because you believe you excelled in the first midterm. Do not make this gamble with your performance. Instead, prepare well for all exams by utilizing the available course resources, forming study groups, and visiting office hours for further guidance.

Q: I am sick on the day of the exam or have a personal emergency and can’t make it to class on exam day. What should I do?

A: Firstly, if you are unwell while on campus, you should contact the [Health Center](#) immediately and your student advisor or the [Student Support & Resources Office](#).

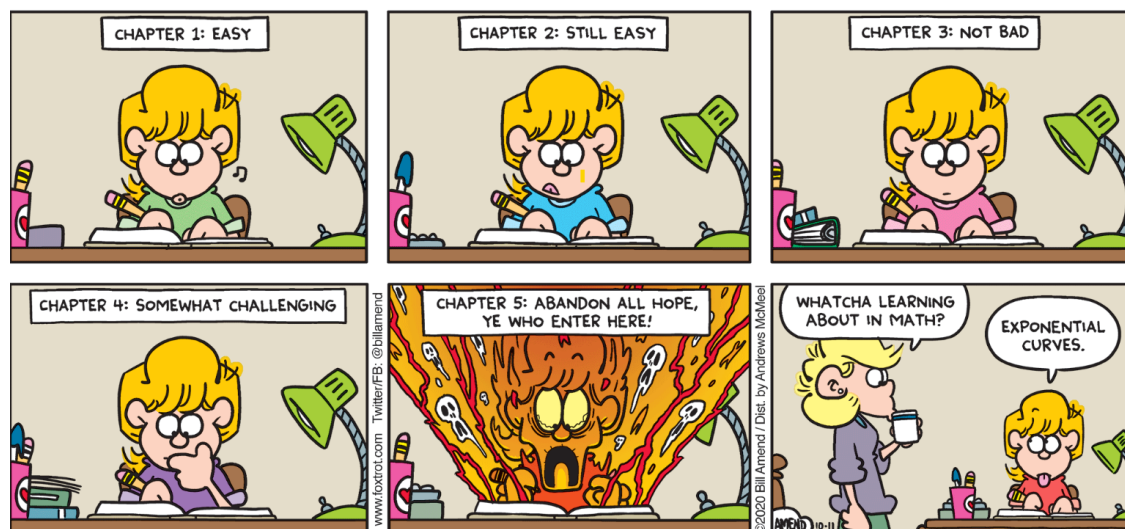
If for **valid reasons, with proofs (a note from the Dean’s office or other school advisors)**, you miss an exam, **please notify me immediately**. Advanced notice is always preferred, and **proofs must be emailed within 36 hours of the missed exam to validate your absence**. Viva voce reports will not be accepted, and you will earn zero on the missed exam(s). Missing class for work, a job interview, or a prescheduled family event **would not** constitute an excused absence.

Under no circumstances will individual exceptions be made when determining grades. This applies to extending deadlines if you forget to complete an assignment. I will not make individual exceptions unless you have an officially approved absence from the university (health center, academic advisor, etc.). The grading methods described above are designed to facilitate life’s unexpected events. Therefore, if you miss an exam with **valid proofs**, your score will be reweighted across your other midterm and final exams. If you don’t report your missed exam **and** provide valid proofs, you will earn zero on the exam. **There are no exceptions to this.**

If you miss both Midterms, you will have to drop the class since we will not have sufficient evidence to assess your performance.

Q: I arrived late for an exam. Will I be given extra time?

A: No. The classrooms and exam proctors are usually only available during the allotted time. We simply don’t have enough resources to facilitate extra time beyond the end of the exam. That said, please make every effort to arrive at the exam on time.



Q: I missed the deadline for a problem set or quiz. What can I do?

A: Problem sets and quizzes are typically due at 9 pm on Fridays and are considered late if submitted after the deadline. **You will earn 0 on your assignment if you submit it past the deadline.** I understand that internet connectivity issues and other demands can affect your submission, but please do not wait until the last minute to do your assignment. While I can reweight a missed exam *for valid reasons*, **assignments cannot be rescheduled or reweighted. You will be allowed to drop one quiz (the lowest or one that you missed due to unforeseen circumstances).** Please use this card wisely.

Q: I feel like I'm behind in the class. Where can I find information to catch up?

A: *Firstly, breathe.* You are doing better than you think! Class information (changes in assignment dates, exam coverage, notification of new files, answers to frequently asked questions) will be posted on the front page of the class Canvas page under [Announcements](#) or on the discussion board. I will post there at least once a week with a general weekly greeting and overview of activities for that week on Sunday, along with handouts or practice problems that I think may be helpful throughout the week. Make sure to keep up with your syllabus and read the text assignments. Lecture sessions will make a world more sense after having done the reading.

Q: Should I email you if I have questions about an assignment or exam?

A: Though I welcome all your questions, **I strongly suggest you post all questions relating to assignments, exam queries, or anything you need clarification on via the CANVAS Discussion forum or Campuswire discussion feed.** To keep conversations organized, you can create chatrooms dedicated to specific assignments and tag the TAs or tutors for assistance with particular questions. However, **please refrain from posting multiple times about the same topic.** Chances are, if you have a question, someone else in the class does too, **so be sure to check the class feed before posting.** In addition, other students are welcome to answer questions posed by their classmates and can upvote the best responses. This is a great way for us to interact and learn from each other (see course objectives 3).

As such, class-related questions will not be answered via email. Of course, **for personal matters**, please don't hesitate to contact me and **put "ECON 1078: [subject of email]" in the subject line of your email.** Due to the many emails I receive daily, I will likely miss your email if you don't adhere to this. **Please allow 24 - 48 hours to receive a reply.**

Dr. P. M. Forni once said "*We respect other people's time when we learn to value it as much as our own. Even better, we can get to a point where we won't distinguish between our time and the time of others.*" In other words, please be respectful of your instructor's time by arriving at lectures and office hours on time and sending emails during the **work week (Monday - Friday) before 10 pm.**

Q: But what if I have to miss class for religious reasons?

A: CU Boulder is committed to fostering an academic community that is respectful and welcoming of individuals from all backgrounds. To support this commitment, our policy on academic accommodations for religious holidays stipulates that students will not be penalized for class absences due to religious observances. If you anticipate observing a religious holiday that coincides with a class meeting, scheduled exam, or assignment deadline, please inform me as soon as possible, preferably within the first two weeks of the course. While I have intentionally avoided scheduling exams on religious holidays, if you encounter any conflicts, don't hesitate to reach out to me immediately.

Q: Will you be lenient if I'm caught cheating, using ChatGPT, plagiarizing, or engaging in unethical behavior?

A: No. You will likely get an "F", and your case will be escalated to the Dean, who will take further action. While you are encouraged to form study groups to discuss assignments and lecture notes, your graded work must result from your independent effort. In fact, **any form of cheating, including improper use of content generated by artificial intelligence, constitutes a violation of the University's academic integrity policy.** Turnitin, which is already in use, is expanding its system to include artificial intelligence detection. You are required to comply with the policies and procedures of [CU Boulder's Honor and Academic Integrity System](#).

Q: What is the proper use of ChatGPT and other AI tools in this course?

A: There are situations and contexts within this course where you can use AI tools to help generate ideas, brainstorm, and gather information about the typical understanding of a topic. However, it is well-known that AI-generated content is often incomplete, inaccurate, and may contain built-in biases that could be offensive. Therefore, we are obliged to be mindful of these considerations, as well as the University's Academic Integrity and AI guidelines. Accordingly, the responsible use of AI tools in this course is outlined as follows^a:

1. **Clear Identification:** You must clearly identify the use of AI-based tools in your work. Any work utilizing AI-based tools must be marked as such, including the specific tool(s) used. For instance, if you use ChatGPT-3, cite it as follows: "ChatGPT-3. (YYYY, Month DD of query). 'Text of your query.' Generated using OpenAI. [Insert Link]." I recommend creating a paper trail for each assignment, including screenshots and timestamps of the prompts used and answers provided.
2. **Transparency:** You must be transparent in how you used the AI-based tool, explaining what work constitutes your original contribution. An AI detector such as GPTZero (<https://gptzero.me/>) may be employed to verify AI-driven work. My recommendation is to create a paper trail for each assignment, taking screenshots and time stamps of the prompts used, answers provided, etc.
3. **Copyright and Intellectual Property:** You must ensure that your use of AI-based tools does not violate any copyright or intellectual property laws.
4. **Quizzes:** AI-based tools are not allowed for quizzes, which will be administered via the Lockdown browser and proctored.
5. **Exams:** Midterms and the Final Exam will be conducted in person, during which the use of technology, including calculators, will be prohibited.

This policy is not exhaustive, and as an academic community, we are still navigating the proper use of this transformational tool. As demonstrated in this policy, I personally do not support the complete restriction of AI generative tools, as they will likely become a required skill in the labor market in the near future. Therefore, my goal is to prepare you as thoroughly as possible to meet the future demands of employers and develop metacognitive habits. However, like any powerful tool, AI must be used responsibly. [This policy may evolve as we receive new information, and any changes will be communicated through Canvas.](#)

^aI want to acknowledge that this policy draws from various sources, including [Professor Lance Eaton's](#) compilation of syllabi policies for AI generative tools, [Dr. Spencer Ross'](#) guidelines for the responsible use of AI in the MKTG 4300 Social Media Marketing course, and ChatGPT-3. Specifically, in the case of the latter, I provided the text and input it into ChatGPT with the following prompt: "You are an economics professor at a prestigious university. Can you edit this for grammar and clarity and provide suggestions regarding the responsible use of AI tools in the classroom?". The output suggests that the message is clear and well-structured. However, it offered some suggestions, including the use of bold-faced sentence headers, as seen in items 1 - 5 above, and made grammatical changes like replacing "transformational" with "transformative," changing "complete restriction" to "complete restriction of," and rephrasing "build metacognitive habits" to "develop metacognitive habits."

Q: What are additional student support resources that I need to know about?

A: CU Boulder has abundant resources to meet your basic needs for a holistic college experience. Below, I list a few that I think you should be aware of.

– **Accessibility:** CU Boulder is committed to ensuring that its physical campus and digital resources are accessible to all. In this course, that means every student should have equitable access to materials and the opportunity to demonstrate mastery. Students with disabilities may benefit from accommodations through the Student Testing Center (STC). Disabilities may include physical, learning, executive function, or mental health conditions. To register or learn more, visit the STC in the CASE Building, Room E130 (first floor), email ✉ testing@colorado.edu, or call 303-735-2044.

– **Health and Wellness Services:** Our campus community is collectively committed to supporting the success and well-being of our students. As a student, you have access to a full range of **on-campus health and wellness services** in addition to a variety of virtual offerings. If you are feeling distressed or overwhelmed, please reach out for help. Students can access confidential resources through the **Counseling and Psychological Services (CAPS)**.

– **Drop-In Peer Tutoring (No monetary cost & no appointment needed):** You are encouraged to take advantage of the **Economics Drop-In Tutorial Lab**, where you can get help with a specific question, review course material, or work through concepts alongside peers. For those seeking more individualized support, the department also maintains a **list of private tutors** (for a fee). In addition, peer tutoring is available not only for this course but also for many introductory classes across Applied Math, Astronomy, Chemistry, Computer Science, Writing, and more. For details, visit the **OUE Tutoring website**.

– **Women in Economics (WiE):** I might as well include a shameless plug for one of the best student organizations on campus—WiE! ☺ Few things are better than connecting with female-identifying rockstars who are committed to making the world a better place through the principles of economics. The great part is, you don't need to be an Econ major to join! If you're curious, passionate about improving our world, and interested in economics, this club is for you. Reach out to ✉ [Alpna Bhatia](#) ASAP!

