

Economics 4808
Introduction to Mathematical Economics
Spring 2026

Professor: Dr. Billy Mertens
Office: Econ 12
Zoom Link: <https://cuboulder.zoom.us/j/5838330659>
E-mail: mertens@colorado.edu While email is the best way to contact me, be aware that I check my email and respond (if time) exactly twice every weekday. Once in the morning (typically around 9am, sometimes earlier). There is usually not enough time to respond to all emails during that time, but I will respond in the afternoon. I typically do not check emails at other times or over the weekend, but there are some exceptions such as exam times. We can set up times to Zoom over the weekend if you give me plenty (2 weeks) of advance notice.
Web: canvas.colorado.edu
Office Hours: T 10:50 – 1:50pm in person (Econ 12), and by appointment.

More about email:

Email is not a very efficient mode of communication when it comes to answering in-depth concept, and also administrative-type questions. These are best asked when the whole class can benefit from the response. Time will be given at the beginning of every class for questions – please utilize this time if you have any questions. If it's something impossible to do at that time and you have class during my office hours, then you can email your question along with your official class schedule and we will set up a meeting.

Course Description:

Econ 4808 is a course that (for some) will improve your math skills, but more importantly, will introduce you to how mathematical tools are applied in economic analysis. The ability to apply mathematics is crucial for economic modeling.

The course covers the mathematics and economic applications of equilibrium, slopes and derivatives, optimization (maximizing profit and utility, and minimizing cost), and constrained optimization (e.g., maximizing utility subject to the budget constraint). Applications include problems in consumer and producer theory, general equilibrium, and welfare economics.

A more detailed outline of covered material is posted separately.

Prerequisites

Principles of Economics, Econ 2010 and Econ 2020, are prerequisites, as are Econ 1078 (Mathematical Tools for Economists 1) and Econ 1088 (Mathematical Tools for Economists 2), or the equivalent. One or more semesters of Calculus would suffice for Econ 1078 and 1088, but **“Business Calculus” is not recommended**. Econ 3070 is a prerequisite. It is **very** important that you fulfill the prerequisites **before** you take this course and still understand the materials in the prerequisites. To be successful in mathematical economics, you need to first be comfortable with algebra and derivatives. If you have any uncertainty as to whether you are under or overqualified to take the course, please talk to me ASAP. The prerequisites must be strictly enforced.

Required Materials:

1. Text: *Essential Mathematics for Economic Analysis* (by Knut Sydsaeter and Peter Hammond) is the official math text for undergraduate economics majors here at C.U. You are expected to own a copy and understand much of the material in this book. The book is the required text for Econ 1078 and Econ 1088 and students in those courses are told to keep and use the book until they finish their undergraduate major in economics. **Book problems will be assigned.**
2. You will need a 4-function or financial (not a graphing) calculator for some exams.

Policy on Cheating:

If you are suspected of cheating, I will immediately and without notification forward your case to the honor code office. This is actually the fairest way to proceed. In these instances, if I took it upon myself to make the decision of whether you violated the honor code, there could be bias involved. The honor code council has both students and faculty members, and they are trained to deal with these types of situations. I will accept the honor code decision as final. If the honor code finds that you did not violate the code, then there will be no repercussions, and all grades will be entered based on your submitted work. If you are found to have violated the honor code (see below), by both the honor code council and I, you will automatically fail the course!

Attendance: Attendance is crucial to success in this class because of the highly cumulative nature of the course material. Attendance will be taken each class and any student missing more than 20% (5 class meetings) of the course's scheduled classes will fail the class. There is no distinction between excused and unexcused absences, with absences for all reasons, including adding the class late, illnesses and emergencies, counting towards this 5-class limit. Students therefore should not email me regarding their absences except in the case of very extenuating circumstances that will cause a multiple week absence, or if they also miss a group assignment or a quiz. Students missing a class should remain aware of the attendance policy and follow the missed-class policy below. I reserve the right to record an absence for students who spend substantial class time on non-class activities.

Material from a Missed Lecture:

If you miss a class, you are responsible for obtaining notes from a classmate and reading the relevant material in the textbook. I encourage you to come to my office hours to discuss the material you missed, but only *after* you have reviewed the relevant material and prepared specific questions.

Electronics in the Classroom

Laptops, tablets, and even phones can actually play a role and benefit learning in many types of classes. There are many pros and cons to allowing consistent use of these devices during the class period. However, it has become abundantly clear to me that these devices are more of a distraction than a learning aid in most situations for economics courses. In addition, taking notes by hand has actually been shown to be more effective than taking them on a laptop or tablet, and use of devices has been shown to lower not only the grades of the users, but also of the surrounding students.

Therefore, electronic devices, *other than tablets used with a writing device*, will NOT be allowed in the classroom (this includes cell phone use for texting, etc.). **You especially cannot use any form of electronic device during Group Assignments (it defeats the purpose of working together). You should take a calculator to class on Group Assignment days and put your phone completely out of sight!**

If you are expecting an important call or text, then simply put your phone on vibrate, sit near the door, and step out when the call/text comes through. Otherwise, keep your phone in your pocket/bag, and **not** on your desk (or I may ask you to put it away or leave the class). Of course, if you have a disability services related need for these devices they will be allowed – in that case notify me of your exception ASAP.

AI:

Please feel free to use AI on any homework/review sets if you find it helpful. It is also good for revising any emails you might be sending. *Since there are no devices allowed during exams or group assignments, you obviously cannot use AI during exams or group assignments. It would defeat the purpose of doing the group assignments and we will go over the answers to every group assignment problem on the board.* I expect everyone to use the restroom prior to our 3 hourly exams, so you can take the 75-minute (it often takes less than 75 minutes) exam without getting up. If you have a phone out during an exam for any reason, you will fail the class.

Class format

This class will be slightly different from many of your usual classes. Some terms for our class format might be “relatively learner-centered” or “semi-rotated”. Research on learning supports the use of these systems, and if I were to ignore them, I would be utilizing outdated and even defective teaching methods. For example, current research demonstrates that repetition helps strengthen neuronetworks and thus, increases long-term learning. Frequent problem solving, reviews and cumulative exams are all effective methods of beneficial repetition. Other research-backed effective systems are outlined below.

A Note on Learning Systems and Assessments:

This course is a little more traditional than many of the other classes I teach. Lecture is still one of the primary components, but group assignments are just as, if not more, important. We will spend at least a little time reviewing for each exam. A little more detail on learning systems is given below:

Learning systems:

1. Lecturing: explaining difficult material not easily learned on your own with text, groups, etc.
2. Exams: exams should be learning tools as well as assessment tools! We will go over each exam in depth in class. Reviewing exams is one area where in-class discussion and explanation are most effective. Just reading answers on a key has been shown to be one of the least effective ways to learn material. Therefore, exam reviews will be the one area of class where no notes, associated pictures or keys will be posted.
3. Group scholarship: we will work some practice problems in groups, which can help your understanding of the material whether you already understand it fairly well or are struggling a bit. These cooperative learning exercises are extremely helpful in preparing you to solve more in-depth analytical problems.

Peer-learning of material is one of the most instructive learning systems because:

- a. *If you are going to inform others about what you know, you must first fully understand it yourselves. If you cannot explain a concept to others you may not fully understand it yourself.*
 - b. *Most “real-world” careers require some form of teamwork skills.*
 - c. *You can discern what it takes to teach others.*
 - d. *It will teach you how to respond to critical questions in front of others.*
4. Self-study: reading the text and solving the review questions.

Assessment systems:

1. Cumulative Exams: shown to improve learning more than virtually every other technique. As noted above, exams are a part of the learning process, not just a part of assessment – we will go over every exam (except, unfortunately, the final) in class. *It is important to review and relearn the material as we build upon that information. This increases long-term learning!* There will be three exams and a cumulative final. Not all exams are cumulative, but the material does build on itself, so it is important to understand all of the concepts as we go.
2. Group assignments will account for part of your grade (see below).
3. In-class Problems can add to your group-assignments grade.

More Information on Assessment:

In-class Problems:

It is important to understand how to apply concepts as we cover them, so you will have the opportunity to work on some problems in class (in pairs or small groups) **almost every day**. You may be selected to show some of these to the class, and this demonstration can add to your group-assignments grade.

Group Assignments and Grading of All Group Content:

The material for this class can be very complex and doing problems in class (often in groups with peer-input) has proven to be more beneficial than traditional problem sets and review problems. We will do in-class problems almost every week. **No laptops or cell phones are allowed during these assignments!!**

These cooperative learning exercises (detailed below) are extremely important. The group assignment dates are listed in the course outline. It is important not to miss these days without an excused absence. The object of these assignments is to work together and engage your brains in the learning process. The goal is NOT to try and finish the assignments quickly, or in most cases, to even finish them at all. You will receive a passing score of 90% just for being present and working on the in-class problems with your group. Additionally, I will typically have a random member of a random group demonstrate a problem at the board, and if you are a member of the group that presents, it can raise your grade for that assignment. **You receive a grade for these assignments by being present on the day we begin the assignment. We will often work on these over the course of two class periods, and while it is important to be present the 2nd day as well, the assignment credit is given only on the first day** (which is also the day listed in the course outline).

Exams

There will be three exams and a cumulative final. These will be given in class on the days listed. No exams will be dropped. To be fair to everybody, I will not answer ANY questions during exams (even about typos) – this puts everyone on equal footing during the exams. Tests will consist of short-answer questions and some longer problems. The exams will all be cumulative, and the material does build on itself, so it is important to understand all the concepts as we go. **Exams will be given in class on the days listed. If you miss an exam with a valid excuse (e.g., illness), then the weight of your final will be increased. Please do Not feel the need to try and reschedule an exam no matter the reason you miss one. We simply reweight the final in all circumstances. If you know in advance that you will miss an exam, sometimes we can arrange for you to take it a day or two early. Note that the exam dates below are not tentative – exams will be given in class on the days listed. NO EXAMS WILL BE DROPPED!!**

Exam Schedule: *all exams will be taken in class!*

Exam 1: Thursday, February 5th

Exam 2: Thursday, March 12th

Exam 3: Thursday, April 16th

Final Exam: Will be in our usual classroom. Check your Buff Portal for official exam times.

Final Exam Conflicts

Official University Policy states that: If you have three or more final exams scheduled on the same day, you are entitled to arrange an alternative exam time for the last exam or exams scheduled on that day. To qualify for rescheduling final exam times, you must provide evidence that you have three or more exams on the same day, and arrangements must be made with your instructor no later than the standard last day to drop a course.

Weights of Assignments:

Group Assignments	15%
Exam I	19%
Exam II	20%
Exam III	21%
Final Exam	25%

Incompletes, Extra Credit, etc.

I adhere strictly to the University guidelines on Incompletes (“An I is given only when students, *beyond their control*, have been unable to complete course requirements. A substantial amount of work must have been *satisfactorily completed* before approval for such a grade is completed.”). Bad grades, unsatisfactory performance, too many credit hours, work conflicts, etc. are not reasons for an incomplete. **I am adamant about giving each student an equal opportunity to perform well in the course, so there will be no extra credit opportunities that are not offered to the entire class. You should focus your efforts on learning the material and doing well on the exams.**

Grading Scale:

Your Score:	Grade:	Your Score:	Grade:
92% to 100%	A	78% to 79%	C+
90% to 91%	A-	72% to 77%	C
88% to 89%	B+	68% to 71%	C-
82% to 87%	B	62% to 67%	D
80% to 81%	B-	60% to 61%	D-

Additional Notes:

Honor Code

All students enrolled in a University of Colorado Boulder course are responsible for knowing and adhering to the [Honor Code](#). Violations of the Honor Code may include but are not limited to: plagiarism (including use of paper writing services or technology [such as essay bots]), cheating, fabrication, lying, bribery, threat, unauthorized access to academic materials, clicker fraud, submitting the same or similar work in more than one course without permission from all course instructors involved, and aiding academic dishonesty. Understanding the course's syllabus is a vital part of adhering to the Honor Code.

All incidents of academic misconduct will be reported to Student Conduct & Conflict Resolution: StudentConduct@colorado.edu. Students found responsible for violating the Honor Code will be assigned resolution outcomes from Student Conduct & Conflict Resolution and will be subject to academic sanctions from the faculty member. Visit [Honor Code](#) for more information on the academic integrity policy.

Accommodation for Disabilities, Temporary Medical Conditions, and Medical Isolation

If you qualify for accommodations because of a disability, please submit your accommodation letter from Disability Services to your faculty member in a timely manner so that your needs can be addressed. Disability Services determines accommodations based on documented disabilities in the academic environment. Information on requesting accommodations is located on the [Disability Services website](#). Contact Disability Services at 303-492-8671 or DSinfo@colorado.edu for further assistance. If you have a temporary medical condition, see [Temporary Medical Conditions](#) on the Disability Services website. **If you are sick and will need an excused absence, unless you are incapacitated, you must notify me immediately (by email) in order to obtain that excused absence status.**

Accommodation for Religious Obligations

Campus policy requires faculty to provide reasonable accommodations for students who, because of religious obligations, have conflicts with scheduled exams, assignments, or required attendance.

Please communicate the need for a religious accommodation in a timely manner. Let me know if you have any religious obligations, have conflicts with scheduled exams, assignments or required attendance within the first week of class and we will make arrangements.

See the [campus policy regarding religious observances](#) for full details.

Preferred Student Names and Pronouns

CU Boulder recognizes that students' legal information does not always align with how they identify. If you wish to have your preferred name (rather than your legal name) and/or your preferred pronouns appear on your instructors' class rosters and in Canvas, visit the [Registrar's website](#) for instructions on how to change your personal information in university systems.

Classroom Behavior

Students and faculty are responsible for maintaining an appropriate learning environment in all instructional settings, whether in person, remote, or online. Failure to adhere to such behavioral standards may be subject to discipline. Professional courtesy and sensitivity are especially important with respect to individuals and topics dealing with race, color, national origin, sex, pregnancy, age, disability, creed, religion, sexual orientation, gender identity, gender expression, veteran status, marital status, political affiliation, or political philosophy.

Additional classroom behavior information

- [Student Classroom and Course-Related Behavior Policy](#).
- [Student Code of Conduct](#).

- [Office of Institutional Equity and Compliance](#).
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Sexual Misconduct, Discrimination, Harassment and/or Related Retaliation

CU Boulder is committed to fostering an inclusive and welcoming learning, working, and living environment. University policy prohibits [protected-class](#) discrimination and harassment, sexual misconduct (harassment, exploitation, and assault), intimate partner abuse (dating or domestic violence), stalking, and related retaliation by or against members of our community on- and off-campus. The Office of Institutional Equity and Compliance (OIEC) addresses these concerns, and individuals who have been subjected to misconduct can contact OIEC at 303-492-2127 or email OIEC@colorado.edu. Information about university policies, [reporting options](#), and [OIEC support resources](#) including confidential services can be found on the [OIEC website](#).

Please know that faculty and graduate instructors are required to inform OIEC when they are made aware of incidents related to these concerns regardless of when or where something occurred. This is to ensure the person impacted receives outreach from OIEC about resolution options and support resources. To learn more about reporting and support a variety of concerns, visit the [Don't Ignore It page](#).

Any University policies that are in conflict with my own policies will supersede my policy!

