Economics 4808
Introduction to Mathematical Economics
Fall 2020

Important!!!! Please note that it is possible that this class may have to switch from "hybrid" to "remote" teaching if conditions change. I have planned changes in place in case of this event, but in any case, if you become ill or just feel unsafe coming to campus, there are alternative options available to you.

Instructor: Billy Mertens
Office: ECON 12; Zoom: https://cuboulder.zoom.us/j/5838330659
E-mail: mertens@colorado.edu Email is by far the best way to contact me. I check my email and respond (if time) every M,W,F and most T,R between 8:30 and 9am. If there is not enough time to respond to all emails during that time, then I will respond in the afternoon between 3:30 and 4pm. I typically do not check emails over the weekend, but we can set up times to Zoom over the weekend.
Web: canvas.colorado.edu
Office Hours: M,W,F 12:30-1:35 & R 8:30-9:45, and by appointment (please give 2 days' notice for appointments). Because of COVID restrictions, all office hours will be on Zoom (link above).

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 over qualified to take the course, please talk to me ASAP. The prerequisites must be strictly enforced.

Prerequisite Quiz
To be sure you are prepared for the material to be covered in this course, you will take a preliminary quiz. The quiz will cover some basic economics and calculus, as well as many of the concepts we will cover in the course. The quiz will be open notes, so you can use any resources you have acquired in previous classes (those from Econ 1088 and 3070 will be especially useful). You must score 50%

or higher on the quiz to avoid having to take another quiz. The quiz *may* (but likely won't) have an impact on your overall grade.

Policy on Cheating:
If you are suspected of cheating, I will immediately and without notification forward your case 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!

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. 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 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-Led Discussions or 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. Some people write out their notes into a tablet; in this case an exception may be made – again notify me ASAP.

This term, our in-class time will be devoted to the group assignments, so please take a calculator (not your phone) with you to class.

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.
3. Your face-covering (see COVID requirements below)

Class Format:
It's a COVID semester! Fortunately, we are able to meet in person. Unfortunately, the university was not able to get us a class big enough to handle more than 12 people at once, and there are 20+ people in the class. This stinks! Anyway, we will meet as often as possible. Over the past several

years, consistently the best feedback for this course has been about the group assignments we do in class. For this reason, I want to devote the time that we can spend in-person doing those assignments. I know that some other classes that don't have space to have everyone present are going to simply lecture and simultaneously Zoom that lecture to the students unable to be there. I see no great advantage in doing that over just having a Zoom lecture. I feel that you really get the most out of class by interacting and problem-solving (with guidance).

Of course, we do need time for lecture, so I will have some lectures on Zoom at the beginning of each section and will add more that will be recorded (hopefully with some student virtual presence) for everyone to access at any time. The most difficult piece of the puzzle will be finding time for group-led discussions/presentations, but I have a detailed plan for scheduling those, and we will go over all course scheduling in detail during the first week of class. You should also check the "Course Outline" link in Canvas.

The first portion of the course will be a fairly basic introduction to the tools used in analyzing natural resource issues. We will then cover some general natural resource topics, and analysis techniques. Finally, we turn to applied problems, and public policy issues.

There are more policies regarding COVID listed in the "Additional Notes" near the end of this syllabus.

Zoom:
During general lectures, I do not require that you have your video and audio turned on. But for all GLD/presentations, and for any group-assignments that we may end up having to do through Zoom, or for some sort of replacement for these assignments done on Zoom (if in-person classes are eliminated by the university), I will require that you keep both your audio and video on. It is very important that people be able to see and hear you in a discussion setting.

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 important. One of the most important changes from prior years is that all exams will be cumulative, and 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. All exams are cumulative, and 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. These will play a minor role given COVID logistics.

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:

These cooperative learning exercises (detailed above) 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 75% just for being present and working on the in-class problems with your group. Also, any group-work that you submit with the names of all members of your group listed by last name in alphabetical order, will receive an additional 10%. Any day that no cell phone of any member of your group is visible, your group will receive an additional 10%. Lastly, if I never see your cell phone during class throughout the entire semester, your overall grade for these assignments will be raised another 5%. Additionally, I will sometimes 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.

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. The material does build on itself, so it is important to understand all of 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. a note from your doctor or Wardenburg), then the weight of your final will be increased. Undocumented illnesses do not**

count as valid excuses (as long as this is not in conflict with a University policy). Note that the exam dates below are <u>not</u> tentative – exams will be given in class on the days listed. NO EXAMS Will Be DROPPED!!

Exam Schedule:
Exam I: Friday, October 2nd on Canvas (through Proctorio)
Exam II: Friday, October 30th on Canvas (through Proctorio)
Exam III: Wednesday, December 2nd on Canvas (through Proctorio)
Final exam: Sunday, December 13th at 1:30pm on Canvas (through Proctorio)

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 **<u>last</u>** 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.

Attendance Policy:
You will be administratively dropped if you do not attend each (all) of the first 3 days of class. The only other policy regarding attendance this year is that you continue to stay involved in the class whether we are remote or not. Canvas tracks usage, and there will be assignemtns due regularly.

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:

COVID requirements:

As a matter of public health and safety due to the pandemic, all members of the CU Boulder community and all visitors to campus must follow university, department and building requirements, and public health orders in place to reduce the risk of spreading infectious disease. Required safety measures at CU Boulder relevant to the classroom setting include:

- maintain 6-foot distancing when possible,
- wear a face covering in public indoor spaces and outdoors while on campus consistent with state and county health orders,
- clean local work area,
- practice hand hygiene,
- follow public health orders, and
- if sick and you live off campus, do not come onto campus (unless instructed by a CU Healthcare professional), or if you live on-campus, please alert CU Boulder Medical Services.

Students who fail to adhere to these requirements will be asked to leave class, and students who do not leave class when asked or who refuse to comply with these requirements will be referred to Student Conduct and Conflict Resolution. For more information, see the policies on COVID-19 Health and Safety and classroom behavior and the Student Code of Conduct. If you require accommodation because a disability prevents you from fulfilling these safety measures, please see the "Accommodation for Disabilities" statement on this syllabus.

Before returning to campus, all students must complete the COVID-19 Student Health and Expectations Course. Before coming on to campus each day, all students are required to complete a Daily Health Form.

Students who have tested positive for COVID-19, have symptoms of COVID-19, or have had close contact with someone who has tested positive for or had symptoms of COVID-19 must stay home and complete the Health Questionnaire and Illness Reporting Form remotely. In this class, if you are sick or quarantined**, *please alert me ASAP. You are NOT required to tell me if you believe you have COVID-19. If you do tell me you have COVID-19, I am required to inform health services.* Overall, please just stay in communication!**

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 policy may include: plagiarism, 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. All incidents of academic misconduct will be reported to the Honor Code (honor@colorado.edu); 303-492-5550). Students found responsible for violating the academic integrity policy will be subject to nonacademic sanctions from the Honor Code as well as academic sanctions from the faculty member. Additional information regarding the Honor Code academic integrity policy can be found at the Honor Code Office website.

Accommodation for Disabilities

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.

Classroom Behavior

Both students and faculty are responsible for maintaining an appropriate learning environment in all instructional settings, whether in person, remote or online. Those who fail 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, political affiliation or political philosophy. For more information, see the policies on classroom behavior and the Student Code of Conduct.

Preferred Student Names and Pronouns

CU Boulder recognizes that students' legal information doesn't always align with how they identify. Students may update their preferred names and pronouns via the student portal; those preferred names and pronouns are listed on instructors' class rosters. In the absence of such updates, the name that appears on the class roster is the student's legal name.

Sexual Misconduct, Discrimination, Harassment and/or Related Retaliation

The University of Colorado Boulder (CU Boulder) is committed to fostering an inclusive and welcoming learning, working, and living environment. CU Boulder will not tolerate acts of sexual misconduct (harassment, exploitation, and assault), intimate partner violence (dating or domestic violence), stalking, or protected-class discrimination or harassment by members of our community. Individuals who believe they have been subject to misconduct or retaliatory actions for reporting a concern should contact the Office of Institutional Equity and Compliance (OIEC) at 303-492-2127 or cureport@colorado.edu. Information about the OIEC, university policies, anonymous reporting, and the campus resources can be found on the OIEC website.
Please know that faculty and instructors have a responsibility to inform OIEC when made aware of incidents of sexual misconduct, dating and domestic violence, stalking, discrimination, harassment and/or related retaliation, to ensure that individuals impacted receive information about options for reporting and support resources.

Religious Holidays

Campus policy regarding religious observances requires that faculty make every effort to deal reasonably and fairly with all students who, because of religious obligations, have conflicts with scheduled exams, assignments or required attendance. See the campus policy regarding religious observances for full details.

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

A reply from one student to another on the discussion board for one of my colleague's online classes: "If you read the course syllabus you will find the answer to your questions. If you do not understand what you read, I recommend you read multiple times. After reading the syllabus if you still have questions come back and I will try to help you as much as possible."