

University of Colorado - Department of Economics  
Mathematical Tools for Economists 1  
Econ 1078 - 002  
Spring 2024

**Instructor:** Dr. Alexander Cauley ([alexander.cauley@colorado.edu](mailto:alexander.cauley@colorado.edu))

**Office:** ECON 10

**Class Time:** Monday, Wednesday, and Friday from 1:25 PM – 2:15 PM in ECON 119.

**Office Hours:** Monday and Wednesday from 11:15 AM - 12:15 PM; Friday from 12:15 PM – 1:15 PM; and by appointment.

**Class URL:** <https://canvas.colorado.edu/courses/102812>

Note: Please direct all emails to my CU email address instead of using Canvas messaging.

**Prerequisites:** None

**Textbook (required):** *Essential Mathematics for Economic Analysis* (4th edition) by Knut Sydsaeter, and Peter Hammond with Arne Strom. Other versions are acceptable; however, chapter numbers may differ. It is your responsibility to match up the chapter topics. You will use this textbook in ECON 1088. There should be a copy of the textbook on reserve in Norlin Library. You may check it out for 24 hours.

**Course Description:** This course is the first of two courses designed to give you the mathematical background necessary for future courses in economics. Math will help you understand and describe the way firms and consumers optimize decisions subject to constraints. It will also provide the building blocks you will use in your statistics and econometrics courses, which will enable you to apply economics concepts to real-world data. These skills are crucial to the study of economics and other sciences.

**Course Objectives:** By the end of this course, you will learn mathematical skills that include:

- Basic college algebra: including real numbers, integer powers, basic algebraic identities and expressions, factoring, fractions, rational exponents, inequalities, intervals, and absolute values.
- Equations: including how to solve simple linear equations (with parameters), systems of two linear equations, quadratic equations and other non-linear equations.
- Set Theory and an introduction to logic (including necessary and sufficient conditions).
- Summation notation and working with summations.
- The following topics relating to functions:
  - The basics: includes the definition of a function, notation, domain and range, and graphs of functions.
  - Linear functions: includes slopes, the general equation for a straight line, slope-intercept form, graphing, linear inequalities, and linear models.
  - Quadratic functions and how they can apply to economic models (e.g., a simple monopoly model).
  - Polynomials: includes factoring polynomials, division, and rational functions.
  - Exponential and logarithmic functions used extensively in intermediate economics courses (e.g., when presenting positive, monotonic transformations).
  - Important function properties and techniques: includes products and quotients, shifting functions, and composite functions.

**Lectures:** Partial attendance for the first three classes is mandatory or you will be administratively dropped from the class to make room for attending students on the waitlist. While attendance will not be taken for the other days, it is strongly suggested that you attend all classes. You are responsible for all information covered in class lectures. If you miss a class, please get notes from one of your classmates. Throughout the semester, I will randomly assign in-class worksheets which you will complete in groups or individually. These worksheets will not be graded for accuracy, and you will receive extra credit toward an upcoming examination for completing them.

**Grading:** Your course grade will consist of two midterm exams, a cumulative final exam, and homework assignments. Each portion of your grade will be weighted as follows:

Midterm 1	15% or 25% *
Midterm 2	15% or 25% *
Final exam	35%
Homework assignments	25%

\*Assignment of weights for midterm 1 and midterm 2 will depend on your midterm scores. The midterm with your lowest score will be weighted 15% and the midterm with your highest score will be weighted 25%.

**Examinations:** All exams will take place in our regular classroom, and will be closed book and closed notes. There will be no make-ups for unexcused missed exams. If you are planning on leaving town, do not schedule your trip on an exam date. The final exam is cumulative – this means that you will be tested on the material from the entire semester. The dates for the examinations are as follows:

Midterm 1	Friday – Feb 23 <sup>rd</sup>
Midterm 2	Friday – Apr 5 <sup>th</sup>
Final exam	Monday – May 6 <sup>th</sup> from 4:30 PM – 7:00 PM

Cell phone calculators and graphing calculators are not allowed during exams. Calculators without graphing capabilities or a programmable memory are allowed.

**Homework Assignments:** Homework assignments will be posted on Canvas. I will announce in class and via email when they are posted. You will be given one week to complete the assignment from the date when it is posted. Submit your homework either through Canvas or by handing in a hard copy in class. If you submit your homework late, there will be a penalty to your grade.

Late assignments and associated penalties:

One class late	20% deduction of your assignment's grade
Two classes late	50% ...
Three or more classes late	90% ...

To avoid penalizing students during the learning phase such as completing homework, homework assignments will be graded on completion. However, please approach these assignments seriously as they play a crucial role in your learning and help you prepare for upcoming examinations. Every problem should be attempted. If you find yourself stuck on any of the problems, please seek my assistance during office hours or ask for help from your classmates. Solutions to the homework assignments will be made available on Canvas for you to review and check your work.

You are allowed, and even encouraged, to work on homework assignments together, as group learning is a great way to develop intuition and build your math skills. However, please submit independently a write-up of your own work.

## Grading Scale:

A	A-	B+	B	B-	C+	C	C-	D+	D	D-	F
94-100	90-93	87-89	83-86	80-82	77-79	73-76	70-72	67-69	63-66	60-62	≤ 59

Note: The embedded links below are accessible via the electronic version of the syllabus uploaded on Canvas.

### 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, political affiliation, or political philosophy.

For more information, see the [classroom behavior policy](#), the [Student Code of Conduct](#), and the [Office of Institutional Equity and Compliance](#).

### Requirements for Infectious Diseases

Members of the CU Boulder community and visitors to campus must follow university, department, and building health and safety requirements and all public health orders to reduce the risk of spreading infectious diseases.

The CU Boulder campus is currently mask optional. However, if masks are again required in classrooms, students who fail to adhere to masking requirements will be asked to leave class. Students who do not leave class when asked or who refuse to comply with these requirements will be referred to Student Conduct & Conflict Resolution. Students who require accommodation because a disability prevents them from fulfilling safety measures related to infectious disease will be asked to follow the steps in the “Accommodation for Disabilities” statement on this syllabus.

For those who feel ill and think you might have COVID-19 or if you have tested positive for COVID-19, please stay home and follow the [further guidance of the Public Health Office](#). For those who have been in close contact with someone who has COVID-19 but do not have any symptoms and have not tested positive for COVID-19, you do not need to stay home.

### Accommodation for Disabilities, Temporary Medical Conditions, and Medical Isolation

[Disability Services](#) determines accommodations based on documented disabilities in the academic environment. If you qualify for accommodations because of a disability, submit your accommodation letter from Disability Services to your faculty member in a timely manner so your needs can be addressed. Contact Disability Services at 303-492-8671 or [dsinfo@colorado.edu](mailto:dsinfo@colorado.edu) for further assistance.

If you have a temporary medical condition or required medical isolation for which you require accommodation, please contact me and we will brainstorm some possible solutions (e.g. making up missed work, extra space to store crutches, etc.).

Also see [Temporary Medical Conditions](#) on the Disability Services website.

### 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.

## **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, 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 Student Conduct & Conflict Resolution: [honor@colorado.edu](mailto:honor@colorado.edu), 303-492-5550. Students found responsible for violating the [Honor Code](#) will be assigned resolution outcomes from the Student Conduct & Conflict Resolution as well as be subject to academic sanctions from the faculty member. Visit [Honor Code](#) for more information on the academic integrity policy.

## **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 violence (dating or domestic violence), stalking, and related retaliation by or against members of our community on- and off-campus. These behaviors harm individuals and our community. The Office of Institutional Equity and Compliance (OIEC) addresses these concerns, and individuals who believe they have been subjected to misconduct can contact OIEC at 303-492-2127 or email [cureport@colorado.edu](mailto:cureport@colorado.edu). Information about university policies, [reporting options](#), and support resources can be found on the [OIEC website](#).

Please know that faculty and graduate instructors have a responsibility to inform OIEC when they are made aware of incidents related to these policies regardless of when or where something occurred. This is to ensure that individuals impacted receive an outreach from OIEC about their options for addressing a concern and the support resources available. To learn more about reporting and support resources for a variety of issues, visit [Don't Ignore It](#).

## **Religious Observance Policy**

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. If you have a conflict, please contact me at the beginning of the term so that we can make proper arrangements.

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

## **Mental Health and Wellness**

The University of Colorado Boulder is committed to the well-being of all students. If you are struggling with personal stressors, mental health or substance use concerns that are impacting academic or daily life, please contact [Counseling and Psychiatric Services \(CAPS\)](#) located in C4C or call (303) 492-2277, 24/7.

Free and unlimited telehealth is also available through [Academic Live Care](#). The Academic Live Care site also provides information about additional wellness services on campus that are available to students.

## **The Economics Department Tutoring and Private Economics Tutors**

The Economics Department provides a free drop-in tutorial office which offers assistance for all core courses in the major, and occasionally for other undergraduate courses in the Department. Its website is: <https://www.colorado.edu/economics/node/513/attachment>.

The Economics Department maintains a list of tutors who are available for private hire. Its website is: <https://www.colorado.edu/economics/node/515/attachment>.