



University of Colorado Boulder
MATH TOOLS FOR ECONOMISTS 2
ECON 1088 SYLLABUS, Fall 2026

INSTRUCTOR: DR. BILLY MERTENS

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 between 9 and 10am, 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: MWF 1:35PM – 2:35PM

INSTRUCTOR BIO:

Billy Mertens, PhD, University of Colorado, 2000, is a senior instructor specializing in teaching undergraduate classes in economic theory. His research interests are in the fields of public choice economics and international trade. He has examined the political effects of international political economic sanctions policies, particularly as applied to dictatorships. He has also conducted a public choice analysis of the motivations behind uses of different immigration policies, and more recently he is focused on research into the pedagogy of economics. Billy enjoys running, coaching (running), mogul skiing, and spending time with family and friends.

TERM START: October 19, 2026

TERM END: December 6, 2026

COURSE WEBSITE

Canvas is our class website:

- Login using your University of Colorado Boulder identikey and password <https://canvas.colorado.edu/>
- Under Course List, click “ECON 1088-581: Math Tools for Economists 2”
- Note: all email correspondence will be through your CU Boulder email address.
 - *Do not use the Canvas email or messages, it is not checked.*

COURSE DESCRIPTION

From General Catalog Teaches mathematical skills for use in economics. Topics include derivatives, optimization and integration. These skills are used on "real world" problems and illustrated with computer assignments.

This course is the second of a two-course sequence (ECON 1078 and ECON 1088), designed to introduce a variety of mathematical concepts which will be used extensively in future economics coursework. 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. This class builds upon the foundation developed in ECON 1078. We will study derivatives, optimization, and integrals. These tools will help you understand the mathematical structure of modern economics and the models used to explain human behavior. A strong grasp of these concepts is necessary (but not sufficient) to succeed in later economics courses.

COURSE PREREQUISITES

Requires prerequisite course of ECON 1078 or MATH 1011 or MATH 1071 or MATH 1150 or MATH 1160 (minimum grade C-) or an ALEKS math exam taken in 2016 or earlier, or placement into pre-calculus based on your admission data and/or CU Boulder coursework.

COURSE OBJECTIVES

By the end of the course, you should be able to:

1. Differentiate
 - Explain the definition of a derivative, including continuity and limits, tangents, slopes, derivative notation, and existence.
 - Complete simple derivative applications, including rates of change, increasing and decreasing functions.
 - Apply simple rules for differentiation, including the power rule, sum and difference rules, constants, product rule, quotient rule, and the chain rule.
 - Complete higher-order derivatives: Includes convex and concave functions as well as n th order derivatives.
 - Calculate derivatives of exponential and logarithmic functions.
 - Calculate elasticities.
2. Complete single-variable optimization applications
 - Explain optimization, test for local and global extrema, the 2nd derivative test, and inflection points.
 - Explain functions and derivatives of many variables.
 - Complete applications with functions of two variables and partial derivatives, including explaining domains, ranges, independent and dependent variables, definitions for partial derivatives, higher order partial derivatives, and geometric representation of partial derivatives.
 - Complete applications with functions of more variables: covering partial derivatives of functions with more variables and economic applications (e.g. partial elasticities).

3. Integrate

- Explain indefinite integrals, including the definition of an integral, and some general rules and uses including finding areas.
- Explain definite integrals and their economic applications.

REQUIRED COURSE MATERIALS

Course Website: <https://canvas.colorado.edu/> (Canvas) Grades and any further additional readings will be posted on Canvas. Please check Canvas frequently for any relevant notifications/changes that may occur throughout the course.

Calculator: You need a scientific calculator that has log and ln (among other) functions. Although the instructors use a TI-84 in the instructional videos, most any scientific calculator will be ok.

Textbook (required): College Mathematics for Business, Economics, Life Sciences, and Social Sciences, 14th edition WITH MYLAB MATH. Published by Pearson, Copyright 2019. By Barnett, Ziegler, Byleen, and Stocker.

You need MyLab Math access for a minimum of 8 weeks. If you are also taking ECON 1088 online through Continuing Education, you will use the same text. Therefore, to save money, purchase access to MyLab Math for the entirety of both courses. Prices (August 2025) for single-term access to MyLab Math is \$94.99 ([purchased through Pearson MyLab](#)). You can also purchase access through the CU Bookstore.

CU Book Access: <https://www.cubookstore.com/bookaccess>

CU Book Access, CU Boulder's equitable access course materials program, provides degree-seeking undergraduate students access to all of their required course materials before the first day of class for a flat-rate price. **The cost of the program for the 2026-27 academic year will be \$269 (plus tax) per semester, fall and spring.**

Materials in this program are provided in a digital first format on or before the first day of class via Canvas, CU Boulder's online learning platform. Should a particular class require print materials, students will receive an email letting them know they have a pick up at the CU Book Store or this information can be found on their My Course Materials tab in Canvas.

If you are not a degree-seeking student, you are not eligible for this program.

Use rational decision-making:

- If you are a degree-seeking student taking at least one course through Boulder Main Campus or Continuing Education, then you need to decide what is best for you. You might want to opt-out and pay the regular price for your textbooks OR you might want to stay in the program and pay \$269 + tax for the books and digital resources included in the program. It will depend on how many courses you are taking and if your textbooks are expensive or not. You need to be a good economist and compare the marginal benefits and the marginal costs of participating in the Book Access program.
- If you are taking a single on-campus class, it is likely that the cost of this program (= \$269 + tax) is greater than the course text cost for that single course. If you do not opt out by the deadline (see CU Book Access), you will be charged for this program.

Supplemental Readings: Supplemental readings and other materials will be provided in Canvas system, via the CU Library electronic reserve, or by links to websites.

ONLINE COURSE STRUCTURE

This course is delivered via distance education format using the CU Canvas system. The asynchronous format will use a combination of readings, online discussion, and other web-based resources. Asynchronous learning does not require real-time (or synchronous) interaction; instead, content is available online for you to access when it best suits your schedule, and assignments are completed prior to the deadlines listed in the schedule. You will interact with the instructor and other students using the communication functions provided by Canvas. You will submit assignments using Canvas, email, or through another online system.

COURSE OUTLINE

Review the separate weekly class schedule found on Canvas under “Syllabus” link.

CLASS PARTICIPATION

This course is designed to engage you mostly through exercises, however, there will also be required professor check-ins to ensure you are as successful as possible.

EVALUATION AND GRADING

Course grades will be determined by the completion of assignments, exams, and discussions, as shown below:

Assignment*	Points per Assignment	Frequency	Number of assignments dropped	GRADE POINTS	GRADE PERCENTAGE
Syllabus Quiz	10	1	0	10	1%
MyLab Quiz	5	1	0	5	0.5%
Proctoring Verification Quiz	10	1	0	10	1%
Topic Homework + Final Exam Prep	20	26	4	440	44%
Proctored Weekly Topics Quiz	50	5	1	200	20%
Professor Check-in	25	3	0	75	7.5%
Proctored Cumulative Final Exam	260	1	0	260	26%
Total				1000	100%

*Keep a copy of all work created for the course, including work submitted through Canvas.

COURSE GRADING CRITERIA, *THERE IS +/- GRADING IN THIS CLASS.*

Grade	Percentage Grade	Equivalent Points	Indicates
A	93-100	930 – 1000	Excellent
A-	90-92.99	900 – 929	
B+	87-89.99	870 – 899	
B	83-86.99	830 – 869	Above Average

B-	80-82.99	800 – 829	
C+	77-79.99	770 – 799	
C	73-77.99	730 – 769	<i>Average</i>
C-	70-72.99	700 – 729	
D+	67-69.99	670 – 699	
D	63-67.99	630 – 669	<i>Below Average</i>
D-	60-62.99	600 – 629	
F	0-59	600 or lower	<i>Failure</i>

ASSIGNMENTS

Syllabus, MyLab, and Proctoring Verification Quizzes (25 POINTS) – These quizzes are to ensure that you are proficient in MyLab, understand the rules and procedures of the course, and are able to use the proctoring tool correctly.

Topic Homeworks or Preparation for Cumulative Final Exam (440 POINTS) – There will be twenty-four (24) 20-point homeworks corresponding to each of the 24 topics in the course and two (2) 20-point assignments to prepare for the cumulative final exam. The format of these homeworks will be multiple choice, calculations, and short answers and will be open book and open notes. Your lowest four (4) of these assignments are dropped from your final grade calculation. These homeworks are designed to check your level of understanding for each topics and help you prepare for the weekly topics quiz. You have one attempt at the homework. These homeworks will be submitted through Canvas or MyLab.

Proctored Weekly Topics Quiz (200 POINTS) – There will be five (5) 50-point quizzes corresponding to the first 5 weeks of the course. The format of quizzes will be multiple choice, calculations, and short answers and will be closed-book and closed-note. Your lowest one (1) quiz is dropped from your final grade calculation. These quizzes are designed to check your level of understanding for the week's topics and help you prepare for the cumulative final exam. You have one attempt at the quiz. Quizzes will be submitted through Canvas or MyLab. The quizzes are completed on Canvas or MyLab in a proctored setting.

Professor Check-in (75 POINTS) – You will meet with your professor a minimum of 3 times during the term to have a brief discussion about the course, coursework, and progress. The goal of these check-ins is to make sure that you are as successful as possible. The accelerated nature of this course means that it is essential that any issues or challenges are identified early to ensure success. We will meet either on Zoom or in-person at a time that works with both of our schedules Monday – Sunday 9am -8pm.

- Check-in schedule: during week 1, during week 3, and during week 6 prior to the final exam.

Proctored Cumulative Final Exam (260 POINTS) – There will be one final exam. The proctored cumulative final exam is worth 260 points. The format of the exam will be multiple choice and calculations and will be closed book and closed note. The exam is completed on Canvas or MyLab in a proctored setting.

This course requires proctored quizzes and examinations. Proctoring requires planning on your part. Proctors are individuals who administer the exam process following the guidelines provided by University of Colorado Boulder to ensure academic integrity.

Who can be my proctor?

If you are in Boulder or nearby, you can take your exam:

1. **With me** at the Department of Economics. There is no cost for using this proctor. This option is only on selected days during the quiz or exam period.
2. With **Proctorio or a comparable online proctoring service as determined by your instructor**. Online proctoring is a service that uses a webcam and microphone to ensure academic integrity. To use this service, you must have access to a computer with a webcam and a microphone. There is no cost for using this proctor.

If you outside of Boulder, you can take your exam:

1. At an **accredited college or university testing center** in your town or nearby. There may be a cost for using this testing center.
2. With **Proctorio or a comparable online proctoring service as determined by your instructor**. Online proctoring is a service that uses a webcam and microphone to ensure academic integrity. To use this service, you must have access to a computer with a webcam and a microphone. There is no cost for using this proctor.

Please see Canvas for detailed information about proctoring, Proctorio, and a nationwide list of accredited college or university testing centers. If you are in a rural area or on a military base, you may need to be approved to use a person as a proctor and information is provided on Canvas for this approval process.

EXTRA CREDIT

Up to 30 points of extra may be available (= maximum 3% of the course grade).

- Up to 30 points extra may be available during the semester for completing certain activities, such as listening and commenting on a podcast, completing special activities, etc. These extra credit opportunities will be determined by the instructor and announced in on Canvas.

POLICY ON DUE DATES

Each module you will complete a series of critical thinking questions that reflect material from the various delivery formats and required readings. It is your responsibility to turn in each assignment on the required date. ***Late assignments are not accepted for exams or professor check-ins. Topic homeworks and topic quizzes can be turned in up to two days late. The grade penalty is 10%.*** The exceptions that may be considered is due to sickness, university excused function, or circumstances beyond the students' control. The instructor reserves the sole right to determine what grounds constitutes a reasonable excuse for missing or submitting a late work assignment and the right to require the student to submit proper verification of such excuse.

EXPECTATIONS OF INSTRUCTOR

I take my role as your instructors very seriously, and, in fact, I care about how well you do in this course and that you have a satisfying, rewarding experience. To that end, it is our commitment to you to

respond individually to the work you submit in this class and to return your work in a timely manner. If, however, due to unforeseeable circumstances, the grading of your work takes longer than the times I have listed here, I will keep you informed of my progress and make every effort to return your work with feedback as soon as I can.

Communication – I am nice and I want you to succeed. Do not hesitate to contact me about anything.

General Course Announcements

- Announcements: Please check the “announcements” section on Canvas often.

COURSE POLICIES

NETIQUETTE

All students should be aware that their behavior impacts other people, even online. I expect that we will all strive to develop a positive and supportive environment and will be courteous to fellow students and your instructor.

TECHNOLOGY REQUIREMENTS AND SUPPORT

What are the basic computer specifications for Canvas?

- Visit the official [Canvas Computer Specifications Page](#) for the latest list of recommended system requirements.

Which browsers does Canvas support?

- Visit the [Supported Browsers Page](#) for the detailed list of internet browsers in Windows, MacOS, iOS and Android.

Skill Requirements

- Students also need to possess basic computer skills, such as:
 - How to use a web browser and word processor
 - How to send and receive email
 - How to locate a file and attach it to an email or upload a file into a course
 - How to copy and paste
 - Must know basic typing skills and keyboard commands
 - Must know basic computer terminology

TECHNICAL SUPPORT

- Canvas technical support. If you are experiencing issues with Canvas please contact:
 - CU Boulder's Help desk at 303-735-4357 (5-HELP) or help@colorado.edu. 5-Help will answer your call: Monday through Friday from 7:30 a.m. to 7:00 p.m., Saturday and Sunday from noon to 6:00 p.m., Closed during [University Holidays](#)
 - On your computer, click the “help” (?) icon on the left side of Canvas, once logged in
 - Within the Canvas App, you can search the Canvas support guides, Report a Problem or chat with Canvas Support 24 hours a day, 7 days a week.
- MyLab tech support:
 - https://help.pearsoncmg.com/ccng/ccng_instr/ccng_xmel_instr_help_support_bridge.html or <https://support.pearson.com/getsupport/s/>

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 for further assistance.

If you have a temporary medical condition or required medical isolation for which you require accommodation, please contact me through email, text, or phone call as soon as possible. Also see [Temporary Medical Conditions](#) on the Disability Services website. If you have a temporary illness, injury or required medical isolation for which you require adjustment, contact the professor immediately to request accommodation.

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](#).

HONOR CODE

"ON MY HONOR, AS A UNIVERSITY OF COLORADO BOULDER STUDENT
I HAVE NEITHER GIVEN NOR RECEIVED UNAUTHORIZED ASSISTANCE."

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 have a temporary illness, injury or required medical isolation for which you require adjustment, contact the professor immediately to request accommodation.

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. Because of the flexibility of timing of completion of assignments in this class, you must contact the instructor in at least one week in advance if you anticipate a religious holiday may impact your completion of coursework. 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](#).
- [Student Code of Conduct](#).
- [Office of Institutional Equity and Compliance](#).

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](#).

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.

COURSE WITHDRAWAL POLICY

Any student who wishes to withdraw from the course must do so by November 14. For complete information, please visit <https://ce.colorado.edu/resources/topics/dates-and-deadlines-online-credit/>

ADDITIONAL SUPPORT SERVICES

A variety of instructional support services, such as writing center, guidance on personal or educational issues, tutoring questions and library resources are available to the students. For more information about their services, visit their websites linked under modules on Canvas.