ECON 1078-003

Math Tools for Economists 1

MWF 12:00 noon - 12:50 pm in ECON 117

Teacher: Akhil Rao

Email: akhil.rao@colorado.edu
Class website: D2L
Office location: ECON 414
Office Hours: MTWR 10:30 am - 11:30 am, and by appointment

This syllabus will guide our class, but it is not set in stone. I will update it throughout the semester to ensure that it reflects our goals and progress.

Course Description: This course is the first of two courses designed to give you the mathematical background necessary for future courses in business and economics. Topics to be covered in this course include basic college-level algebra, simple linear and nonlinear equations, functions and their graphs, systems of equations, set theory, summation, logic and proofs.

Text: *Essential Mathematics for Economic Analysis*, 4th Edition
Authors: Knut Sydsaeter, Peter Hammond, and Arne Strom

Course Objectives:
After taking this class, you should have an understanding of:

1. Basic college algebra: including real numbers, integer powers, basic algebraic identities and expressions, factoring, fractions, rational exponents, inequalities, intervals and absolute values.
2. Equations: including how to solve simple linear equations (with parameters), systems of two linear equations, quadratic equations and other non-linear equations.
3. Set Theory and an introduction to logic (including necessary and sufficient conditions).
4. Summation notation and working with summations (vital for Econ 3818).

and the following topics relating to functions:

1. The basics: Includes the definition of a function, notation, domain and range, and graphs of functions.
2. Linear functions: Includes slopes, the general equation for a straight line, slope-intercept form, graphing, linear inequalities, and linear models.
3. Quadratic functions and how they can apply to economic models (e.g. a simple monopoly model).
4. Polynomials: Includes factoring polynomials, division, and rational functions (these skills are often employed in Econ 3070).

5. Exponential and logarithmic functions used extensively in intermediate economics courses (e.g. when presenting positive, monotonic transformations).
6. Important function properties and techniques: Includes products and quotients, shifting functions, and composite functions.

When in doubt, consult the syllabus. Email me if it doesn't answer your question(s). Please allow me 24 hours to respond.

Course Expectations:

You can expect me to

- be prepared for the day's work and do my best to assist you in your course work;

- treat you fairly, professionally, and respectfully at all times;

- be available and attentive during office hours, and respond to emails within 24 hours.

I expect you to

- regularly attend class, be punctual, and silence your phone(s);

- complete all assignments and turn them in on time;

- be respectful to and cooperate with your classmates and I;

- ask questions about the material.

Course Policies:

- **General**

  - Computers are not to be used for purposes other than note-taking, unless instructed to do so.
  - Exams are closed book, closed notes. All you will need are pens or pencils.
  - The weekly coverage might change as it depends on the progress of the class. You are responsible for checking the syllabus and D2L for assignment due dates.
  - **No makeup exams will be given.**

- **Notes**

  - I do not distribute my lecture notes. I will ask you to do practice problems during class. Bringing a notebook and pencil to work these out is a good idea.
  - You are responsible for obtaining the notes from lecture. If you must miss lecture for any reason, please get the notes from a classmate.

- **Assignments**

- I will create 8 take-home problem sets. You may use your lecture notes, your textbook, and your computer to work out these problems. Each problem set will be graded on a scale of 0-5 points: 2 points for completeness, and 3 points for correctness on selected questions which I will grade in detail. Occasionally a problem set will be for 10 points, in which case 4 points will be for completeness and 6 points for correctness on selected problems.

- I will assign readings throughout the semester. You will be responsible for turning in typed summaries of the readings on D2L. The summaries must be at least half a page, and may be up to 1 page. They will be graded on a scale of 0-1: 0 if incomplete, 1 if complete. The summaries should cover the content of the readings, but also a little of what you thought of them. These summaries are so that I know you have done the readings.

- Your total assignments grade will combine your scores on all of the problem sets and the reading summaries.

- Information about assignments will be given in class, on the syllabus, and on D2L. You are responsible for keeping track of assignment due dates and submission guidelines.

- **No late assignments will be accepted under any circumstances**.

- **Attendance**

  - Attendance is expected and will be taken via clicker beginning in week 2. Your lowest 3 clicker scores will be dropped.

  - Each clicker question will be worth 3 points: 2 for attendance, and 1 for correctness.

  - Students are responsible for all missed work, regardless of the reason for absence.

  - Using multiple clickers to answer a question for someone who is absent is not allowed. Such instances will be treated as cheating by all involved, and followed up on accordingly.

- **Computers, calculators, and clickers**

  - I encourage you to use tools like graphing calculators/websites and computer algebra systems to better understand the material and work through the problem sets. However, "because my calculator said so" is not a sufficient answer to a question with computations.

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

  - **Using computers in class for anything other than taking notes is strictly prohibited.** The first time I see you using a computer for something else, I will ask you to put the computer away. Repeated infractions will result in stronger penalties at my discretion.

  - You may work with your classmates to solve in-class clicker questions, unless instructed otherwise for particular questions.

- **Office hours**

- I encourage you to come to my office hours to discuss any of the material from lecture. Please bring notes and specific questions.
- If the posted office hours don't work for you, email me and we will set up an appointment.

I reserve the right to modify the policies listed above.

Grading Framework:

Clicker questions	10%
Assignments	30%
Midterm exam 1	15%
Midterm exam 2	15%
Final Exam	30%

Letter Grade Distribution:

>= 94.00	A	73.00 - 76.99	C	
90.00 - 93.99	A-	70.00 - 72.99	C-	
87.00 - 89.99	B+	67.00 - 69.99	D+	
83.00 - 86.99	B	63.00 - 66.99	D	
80.00 - 82.99	B-	60.00 - 62.99	D-	
77.00 - 79.99	C+	<= 59.99	F	

Additional information:

Disability Accomodations: If you qualify for accommodations because of a disability, please submit to me a letter from Disability Services in a timely manner so that your needs be addressed. Disability Services determines accommodations based on documented disabilities. Contact: 303-492-8671, Center for Community N200, and

    http://www.Colorado.EDU/disabilityservices

. If you have a temporary medical condition or injury, see guidelines at

    http://www.colorado.edu/disabilityservices/go.cgi?select=temporary.html.

Disability Services' letters for students with disabilities indicate legally mandated reasonable accommodations. The syllabus statements and answers to Frequently Asked Questions can be found at http://www.colorado.edu/disabilityservices.

Religious Observance Policy: Campus policy regarding religious observances requires that faculty make every effort to reasonably and fairly deal 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 we can make proper arrangements.

Classroom Behavior Policy: Students and faculty each have responsibility for maintaining an appropriate learning environment. Students who fail to adhere to such behavioral standards may be subject to discipline. Faculty has the professional responsibility to treat all students with understanding, dignity and respect, to guide classroom discussion and to set reasonable limits on the manner in which they and their students express opinions.
Professional courtesy and sensitivity are especially important with respect to individuals and topics dealing with differences of race, culture, religion, politics, sexual orientation, gender variance, and

nationalities. Class rosters are provided to the instructor with the student's legal name. I will gladly honor your request to address you by an alternate name or gender pronoun. Please advise me of this preference early in the semester so that I may make appropriate changes to my records. See policies at

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http://www.colorado.edu/policies/classbehavior.html
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and at

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http://www.colorado.edu/studentaffairs/judicialaffairs/code.html#student_cod
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Honor Code: All students of the University of Colorado at Boulder are responsible for knowing and adhering to the academic integrity policy of this institution. Violations of this policy may include: cheating, plagiarism, aid of academic dishonesty, fabrication, lying, bribery, and threatening behavior. All incidents of academic misconduct shall be reported to the Honor Code Council (honor@colorado.edu; 303-725-2273).
Students who are found to be in violation of the academic integrity policy will be subject to both academic sanctions from the faculty member and non-academic sanctions (including but not limited to university probation, suspension, or expulsion). Other information on the Honor Code can be found at honorcode.colorado.edu or

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http://www.colorado.edu/policies/honor.html
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Discrimination & Harassment Policy: The University of Colorado at Boulder Discrimination and Harassment Policy and Procedures, the University of Colorado Sexual Harassment Policy and Procedures, and the University of Colorado Conflict of Interest in Cases of Amorous Relationships Policy apply to all students, staff, and faculty. Any student, staff, or faculty member who believes s/he has been the subject of sexual harassment or discrimination or harassment based upon race, color, national origin, sex, pregnancy, age, disability, creed, religion, sexual orientation, gender identity, gender expression or veteran status should contact the Office of Discrimination and Harassment (ODH) at 303-492-2127, or the Office of Student Conduct (OSC) at 303-492-5550. Information about the ODH, the above referenced policies, and the campus resources available to assist individuals regarding discrimination or harassment can be obtained at http://www.colorado.edu/odh.

Course Schedule:

Week	Content
Week 1 (8/28, 8/30, 9/1)	• Course material: 1.1, 1.2, 1.3 • Topics: Numbers, Integer powers, Rules of algebra • Assignments: Read *The Imaginary That Isn't*, PS1 issued 9/1
Week 2 (9/6, 9/8)	• Course material: 1.4, 1.5 • Topics: Fractions, Fractional powers • Assignments: PS1 due 9/8
Week 3 (9/11, 9/13, 9/15)	• Course material: 1.6, 1.7, 2.1 • Topics: Inequalities, Intervals and absolute value, Simple equations • Assignments: PS2 issued 9/15
Week 4 (9/18, 9/20, 9/22)	• Course material: 3.4, 3.5, 3.6 • Topics: Logic, Proofs, Set theory • Assignments: Read *How to Prove It*, pages 84-93
Week 5 (9/25, 9/27, 9/29)	• Course material: 2.2, 2.3, 2.4 • Topics: Equations with parameters, Quadratic equations, Linear equations in two unknowns • Assignments: PS2 due 9/25
Week 6 (10/2, 10/4, 10/6)	• Course material: Review, **Exam 1 (Wednesday 10/4)**, 2.5 • Topics: Nonlinear equations • Assignments: PS3 issued 10/6
Week 7 (10/9, 10/11, 10/13)	• Course material: 4.1, 4.2, 4.3 • Topics: Functions, Graphing • Assignments: PS3 due 10/13
Week 8 (10/16, 10/18, 10/20)	• Course material: 4.4, 4.5, 4.6 • Topics: Linear functions, Quadratic functions • Assignments: PS4 issued 10/16
Week 9 (10/23, 10/25, 10/27)	• Course material: 4.7, 4.8, 4.9 • Topics: Polynomials, Power functions, Exponential functions • Assignments: PS4 due 10/27
Week 10 (10/30, 11/1, 11/3)	• Course material: 4.10, 5.1, 5.2 • Topics: Logarithmic functions, Shifting graphs, New functions from old • Assignments: PS5 issued 10/30
Week 11 (11/6, 11/8, 11/10)	• Course material: Review, **Exam 2 (Wednesday 11/8)**, 5.3 • Topics: Inverse functions • Assignments: PS5 due 11/6; PS6 issued 11/10
Week 12 (11/13, 11/15, 11/17)	• Course material: 5.4, 5.5, 5.6 • Topics: Graphing equations, Distance in the plane, General functions • Assignments: PS6 due 11/15; PS7 issued 11/17
Week 13 (Fall Break)	
Week 14 (11/27, 11/29, 12/1)	• Course material: 3.1, 3.2, 3.3 • Topics: Summation notation, Rules of sums, Double sums • Assignments: PS7 due 11/29; PS8 issued 12/1
Week 15 (12/4, 12/6, 12/8)	• Course material: 3.7, 15.1, 15.2 • Topics: Induction, Systems of linear equations, Matrices and matrix operations • Assignments: Reading (TBD)
Week 16 (12/11, 12/13)	• Review for final exam • Assignments: PS8 due 12/13