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
O ce location: ECON 414
O ce 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 re ects our goals and progress.

Course Description: This course is the rst 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 su cient conditions).
4. Summation notation and working with summations (vital for Econ 3818).

and the following topics relating to functions:

1. The basics: Includes the de nition 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 o ce 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 encourage you to come to my o ce hours to discuss any of the material from lecture. Please bring notes and speci c questions.

{ If the posted o ce 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

nationalities. Class rosters are provided to the instructor with the student's legal name. I will

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 nal exam Assignments: PS8 due 12/13