Introduction to Mathematics for Business and Economics Syllabus

University of Southern California

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Course and instructor information

Course ID: MATH 117g
Section: 39410
Units: 4
Term: Spring 2022

Prerequisite: MATH 040
Lecture: MWF, 12-12:50pm, CPA 100
Discussion: TTh, 10-10:50am, KAP 167
TTh, 11-11:50am, WPH B28

Instructor: Jared Warner
Office: KAP 256 and Zoom room
Office hours: MWF 10-11am
TTh 8-9pm (virtual only)
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Office hours: ???
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Course Description: Functions, graphs, polynomial and rational functions, exponential and logarithmic functions, matrices, systems of linear equations.

Course materials and resources

Textbook (recommended)

Jay Abramson. *Precalculus*, OpenStax. This textbook is available for free download here. You can use this book for supplementary reading, but we won't follow it too closely.

Gradescope (required)

All course assessments will be submitted through Gradescope. We will learn how to use Gradescope together in class, but you can familiarize yourself by watching this video or reading this guide.

Desmos (recommended)

To visualize various course concepts, we will use the free and powerful online graphing software called Desmos. Learning how to use Desmos will benefit you throughout the course.

Blackboard (recommended)

All course announcements and content will be posted on Blackboard. You should make sure to read all Blackboard announcements to receive current information about our course.

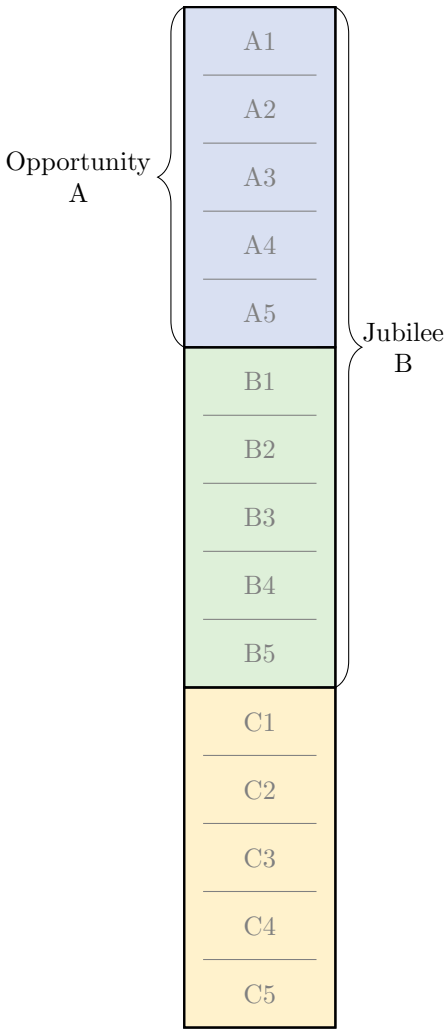
Course snapshot

(Read this page for a quick overview of the course structure.)

This is a learning **outcome** (our first one!):

> **A1 - Functions and their graphs:** I can interpret and use mathematical notation and vocabulary related to the concepts of a function and the graph of a function.

You have a score for each outcome ranging from 0 to 4 indicating how well you've demonstrated that outcome. A score of 4 means you've **mastered** the outcome. There are 15 outcomes in total, split into Units A, B, and C.



You can improve your outcome scores through opportunities and jubilees.

- **Opportunities** are like midterms, and they cover one unit. For example, Opportunity A covers the outcomes from Unit A. Your outcome scores will increase (up to a 4 for each outcome) depending on how well you answer the questions on an opportunity.
- **Jubilees** are like re-takes, and they cover all previous outcomes. For example, Jubilee B covers Units A and B. Higher outcome scores on jubilees replace lower previous scores, but lower scores on jubilees are discarded. You earn the right to see previous outcomes on a jubilee by completing practice problems.

Once you master an outcome, you won't see that outcome again on any subsequent jubilee, but it may appear again on the final. A strong performance on the final may also boost your outcome scores.

Your outcome scores are 60% of your grade. The remaining 40% is a combination of your scores on the final and applications. **Applications** are mini-assignments, each worth up to 5% of your grade, that explore how math is applied to the real-world. You can complete up to two applications. Your grade will be calculated using whichever of the following three distributions gives you a higher score.

Outcome scores 60%	Final 40%

or

Outcome scores 60%	App. 5%	Final 35%

or

Outcome scores 60%	App. 10%	Final 30%

Completing applications is optional, because if you choose not to, your final will just be worth more.

That's it! As you read the details in the rest of the syllabus, keep this course snapshot in mind.

Learning outcomes

The course will focus on the following 15 learning outcomes. Each learning outcome is a statement of what you will do through a successful completion of the course. The outcomes are split into three units (Units A, B, and C), and each unit will take approximately one month of class time.

Outcome	Textbook section(s)
A1 - Functions and their graphs: I can interpret and use mathematical notation and vocabulary related to the concepts of a function and the graph of a function.	1.1 - 1.3
A2 - Function composition and inversion: I can compose functions, invert functions, and interpret relationships between inverse functions via composition.	1.4, 1.7
A3 - Transformations of functions: I can identify shifts, stretches, and compressions of a function via its graph and its defining formula.	1.5
A4 - Linear functions: I can write and graph linear functions and solve linear equations.	2.1, 2.2
A5 - Linear modeling and regression: I can use data to find and interpret a linear relationship between quantities in a given context.	2.3, 2.4
B1 - Quadratic functions: I can write and graph quadratic functions in various forms, and find their vertices and roots.	3.2
B2 - Power functions: I can recognize the shape of a power function's graph based on its exponent, and model various phenomena with power functions.	3.3
B3 - Polynomial functions: I can write and graph polynomial functions, identify their end behavior, and use technology to find their local extrema.	3.3, 3.4
B4 - Zeros of polynomial functions: I can find real zeros of polynomial functions by hand and using technology.	3.5, 3.6
B5 - Rational functions: I can write and graph rational functions, and find their domains, zeros, and asymptotes.	3.7
C1 - Exponential functions: I can write and graph functions representing both exponential growth and exponential decay.	4.1, 4.2
C2 - Logarithmic functions: I can define a logarithm, graph logarithmic functions, and use the properties of logarithms to simplify logarithmic expressions.	4.3, 4.4, 4.5
C3 - Exponential modeling and regression: I can solve exponential equations and use data to find and interpret an exponential relationship between quantities in context.	4.6, 4.7, 4.8
C4 - Gaussian elimination: I can identify inconsistent systems of linear equations, and solve independent and dependent systems of linear equations using Gaussian elimination.	9.1, 9.2, 9.6
C5 - Inverse matrices: I can multiply matrices, find matrix inverses, and use matrix inverses to solve systems of linear equations.	9.5, 9.7

Throughout the semester, you will take various in-class assessments to demonstrate your grasp of these outcomes. Each outcome is graded on a scale from 0 to 4, with a 4 representing mastery of the outcome. Each outcome can be assessed multiple times so that a low outcome score on an early assessment can be replaced with a higher score on a later assessment. Your grade at the end of the semester will be determined partially by your outcome scores.

Grading system

This course will use a mastery-based grading system that is designed to keep our focus on the learning outcomes, emphasize deep understanding of concepts, provide multiple opportunities for students to demonstrate mastery of concepts, and accommodate students with varying mathematical backgrounds.

Below is a description of the various assessments that will determine your grade: opportunities, jubilees, applications, and the final. All in-class assessments are timed and must be completed individually. You may use a scientific calculator (such as a TI-30X), but no graphing calculators are allowed. You may also use one sheet of notes (8.5x11), front and back, written in your own handwriting.

Opportunities (like midterms): At the end of each unit, you can take an opportunity to demonstrate mastery of that unit's learning outcomes. Opportunities have 5 questions (1 per outcome) and each question is scored from 0 to 4.

Jubilees (like re-takes): About two weeks after an opportunity, you can take a jubilee to improve your scores on outcomes you haven't mastered yet. A higher outcome score on a jubilee will replace your current outcome score. The questions your jubilee contains depend on how many credits you've earned (see the section on "Practice problems and credits" on the next page).

Assessment schedule: The tables below have all of the dates for in-class assessments.

Date	Assessment	Class
2/14	Opportunity A	Lec.
3/1	Jubilee A	Disc.

Date	Assessment	Class
3/25	Opportunity B	Lec.
4/7	Jubilee B	Disc.

Date	Assessment	Class
4/25	Opportunity C	Lec.
4/29	Jubilee C	Lec.

To illustrate how your outcome scores change throughout these assessments, suppose your scores for Outcome A1 on Opportunity A, Jubilee A, and Jubilee B are 2, 1, and 4. The 2 from Opportunity A is not replaced by the 1 from Jubilee A, but it is replaced by the 4 from Jubilee B. You've now mastered A1 and won't see it on any subsequent assessments.

Applications (like an assignment): Applications are mini-assignments that explore how math is applied to the real-world. When you complete an application, you must present your work in office hours. Completing applications is optional, and can be worth 0%, 5%, or 10% of your grade. See the "Applications" link on Blackboard for more details.

Final: The final will be comprehensive and is worth 30%, 35%, or 40% of your grade, depending on your scores on the final and the applications assignment. The date of the final is Friday, May 6th, 11am-1pm. You must take the final to pass the class.

Grade: Your total score (out of 100) will be the sum of your outcome scores as achieved on opportunities and jubilees (out of 60) and your applications + final score (out of 40). The table below shows the lowest letter grade you can receive for a given total score. For example, if your score is an 83, you are guaranteed a B, and perhaps a higher grade depending on your performance relative to other MATH 117 students.

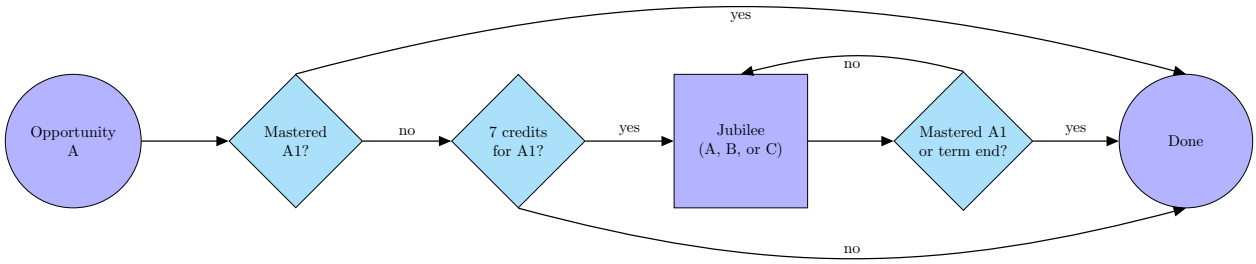
A 93 to 100	A- 90 to 92	B+ 87 to 89	B 83 to 86	B- 80 to 82	C+ 77 to 79
C 73 to 76	C- 70 to 72	D+ 67 to 69	D 63 to 66	D- 60 to 63	F 0 to 59

Practice problems and credits

Like most skills, mathematical proficiency is gained through practice. Each outcome is paired with 10 practice problems on Blackboard, listed under "Practice." These problems are similar to questions on opportunities and jubilees. Practice problems contribute nothing to your grade, but they allow you to earn credits which give you extra chances to master outcomes you missed on previous opportunities.

You have unlimited chances to answer each practice problem, and each problem you answer correctly is worth 1 credit for the associated outcome. For example, if you answer all 10 practice problems correctly for outcome A1, then you'll have 10 credits for outcome A1.

If you have earned at least 7 credits for a particular outcome you haven't mastered yet, you will have an extra chance to master that outcome on all future jubilees (recall that you've mastered an outcome when your score for that outcome is 4). The flow chart below illustrates this process for outcome A1.



Due dates: You can complete practice problems whenever you'd like for full consideration (i.e. there are no due dates and no late penalties). However, there are deadlines you must meet if you want your credits to count towards getting extra chances on your jubilees.

- To have your practice problems credited to Jubilee A (on 3/1), complete them by 2/27 at 9pm.
- To have your practice problems credited to Jubilee B (on 4/7), complete them by 4/5 at 9pm.
- To have your practice problems credited to Jubilee C (on 4/29), submit your work by 4/27 at 9pm.

Tips for success

Pay attention to your progress reports: You will regularly receive a progress report to help you keep track of your outcome scores, your credits, and what questions you'll see on your next jubilee. Make sure you know how to read this progress report so you can maintain progress toward achieving the grade you want. If you notice a mistake with your progress report, you should reach out to me so I can address it.

Review your scores on Gradescope: When you get back a graded assessment on Gradescope, make sure you understand every mistake you made, and practice solving those problems again to be ready for the next assessment. If you feel your work has been graded inappropriately, you can submit a regrade request through Gradescope to have the grader consider your work again. If you receive a 3.5 on a problem, this means you can correct your mistake via email to improve your score to a 4.

Take lecture seriously: The lectures are designed with interactive components to help you build the conceptual understanding as a basis for problem-solving. We will also have time to practice problem-solving within lecture. Following along with lecture should set you up for success on the practice problems and the assessments.

Attend discussion and/or office hours for help with practice problems: The practice problems are challenging, but along with the problems from lecture they represent the best way to prepare for assessments. Working through them alone can be very frustrating. Avoid this frustration by attending discussion and/or

office hours to work on these problems with classmates or an instructor.

Devote the appropriate amount of time outside of class: According to the USC Curriculum Office's policy on contact hours, for every one hour of in-class contact time per week, students are expected to complete two hours of out of class work per week. Since we have lecture for 2.5 hours each week, this policy suggests you spend 5 hours each week working on this course outside of class. This time can be spent preparing for lecture, completing practice problems and/or applications, and studying for in-class assessments.

Work and study in groups: Learning can be both an individual and social endeavor. You'll need to be intentional to benefit from learning in groups. To this end, you are encouraged to work with a group in lecture and discussion to solve problems in class. Even better, form a study group that meets regularly outside of class to work on math.

Get off to a good start: Try to do well on early assessments. The grading system provides for flexibility but the course will move fast. If you save too many outcomes for later, they will accumulate. If you improve your scores as much as you can in the beginning, then you will have fewer outcomes to focus on later in the semester.

Schedule of lectures

Below is a tentative schedule for the course lectures. Amendments to this schedule will be announced on Blackboard.

Dates	Lecture topic
1/10, 1/12	Course introduction and prerequisite review
1/14, 1/19, 1/21	Functions and their graphs
1/24, 1/26	Function composition and inversion
1/28, 1/31	Transformations of functions
2/2, 2/4	Linear functions
2/7, 2/9, 2/11	Linear modeling and regression
1/25	Opportunity A
2/16, 2/18, 2/23	Quadratic functions
2/25, 2/28	Power functions
3/2, 3/4	Polynomial functions
3/7, 3/9	Zeros of polynomial functions
3/11, 3/21, 3/23	Rational functions
3/25	Opportunity B
3/28, 3/30	Exponential functions
4/1, 4/4	Logarithmic functions
4/6, 4/8, 4/11	Exponential modeling and regression
4/13, 4/15	Gaussian elimination
4/18, 4/20, 4/22	Inverse matrices

4/25	Opportunity C
4/27	Review
4/29	Jubilee C
5/6	Final

Policies and statements

Attendance and participation: A careful reading of this syllabus reveals that you don't receive any credit toward your grade for attendance or participation. If attending and/or participating in class is helpful for your learning, then you should do it. Otherwise, you should not. Note that for most students (if not all), attendance and participation are helpful and therefore you are encouraged to attend and participate in class.

Hybrid/asynchronous instruction: You can choose to attend live class virtually using the "Zoom" link on Blackboard. You should keep your microphone muted, but you may unmute yourself to ask questions. Your questions should be heard through the classroom speakers. You can also choose to watch recordings of classes also posted on Blackboard using the "Zoom" link.

Missing an assessment: All assessments must be taken in-person, unless otherwise arranged due to extraordinary circumstances. If you anticipate missing an in-class assessment, you must inform me with at least 24 hours notice. Depending on the situation, I may allow you to have double-time on our next jubilee to make up for your lost time, or I may use your performance on the final to act as a stand-in for the missed assessment. If you receive double-time on a jubilee, it is your responsibility to make sure you're available within the necessary time window on the date of the jubilee. This may include consulting with other professors if the time window conflicts with another course.

If you miss the final for a documented emergency, you will receive a grade of IN. Consult the Office of Academic Records and Registrar for more information about an IN grade.

Statement on academic integrity: USC seeks to maintain an optimal learning environment. General principles of academic honesty include the concept of respect for the intellectual property of others, the expectation that individual work will be submitted unless otherwise allowed by an instructor, and the obligations both to protect one's own academic work from misuse by others as well as to avoid using another's work as one's own. All students are expected to understand and abide by these principles. SCampus, the Student Guidebook, contains the University Student Conduct Code (see University Governance, Section 11.00), while the recommended sanctions are located in Appendix A.

Statement for students with disabilities: Any student requesting academic accommodations based on a disability is required to register with Disability Services and Programs (DSP) each semester. A letter of verification for approved accommodations can be obtained from DSP. Please be sure the letter is delivered to the instructor (or the teaching assistant) as early in the semester as possible. DSP is located in GFS 120 and is open 8:30 a.m.–5:00 p.m., Monday through Friday.
Website: https://dsp.usc.edu/
Contact information: (213) 740-0776 (Phone), (213) 740-6948 (TDD only), (213) 740-8216 (FAX) dspfrontdesk@usc.edu.

Support resources

Office hours
Please stop by to visit me! Office hours are a time for your to ask me about any misunderstandings you

have about the course. You can ask for help on practice problems, on applications, and on preparing for opportunities and jubilees. See the first page of the syllabus for my office hours. Some office hours can only be attended in my personal meeting room on Zoom.

Math Center
The USC Math Center (KAP 263) is a place to go if you want help with your math classes. Please visit the Math Center website for more information.

Counseling and Mental Health
Phone: (213) 740-9355 (available 24/7)
Website: studenthealth.usc.edu/counseling
Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention.

National Suicide Prevention Lifeline
Phone: 1 (800) 273-8255 (available 24/7)
Website: suicidepreventionlifeline.org/
Free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week.

Relationship and Sexual Violence Prevention Services (RSVP)
Phone: (213) 740-9355 (24/7, press "0" after hours)
Website: studenthealth.usc.edu/sexual-assault
Free and confidential therapy services, workshops, and training for situations related to gender-based harm.

Office of Equity and Diversity (OED)
Phone: (213) 740-5086, Title IX - (213) 821-8298
Website: equity.usc.edu, titleix.usc.edu
Information about how to get help or help someone affected by harassment or discrimination, rights of protected classes, reporting options, and additional resources for students, faculty, staff, visitors, and applicants.

Reporting Incidents of Bias or Harassment
Phone: (213) 740-5086 or (213) 821-8298
Website: usc-advocate.symplicity.com/care_report
Avenue to report incidents of bias, hate crimes, and microaggressions to the Office of Equity and Diversity —Title IX for appropriate investigation, supportive measures, and response.

The Office of Disability Services and Programs
Phone: (213) 740-0776
Website: dsp.usc.edu
Support and accommodations for students with disabilities. Services include assistance in providing readers/notetakers/interpreters, special accommodations for test taking needs, assistance with architectural barriers, assistive technology, and support for individual needs.

USC Campus Support and Intervention
Phone: (213) 821-4710
Website: campussupport.usc.edu
Assists students and families in resolving complex personal, financial, and academic issues adversely affecting their success as a student.

Diversity at USC
Phone: (213) 740-2101
Website: diversity.usc.edu
Information on events, programs and training, the Provost's Diversity and Inclusion Council, Diversity Li-

aisons for each academic school, chronology, participation, and various resources for students.

USC Emergency
Phone: UPC: (213) 740-4321, HSC: (323) 442-1000 (available 24/7)
Website: dps.usc.edu, emergency.usc.edu
Emergency assistance and avenue to report a crime. Latest updates regarding safety, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible.

USC Department of Public Saftey
Phone: (213) 740-6000 (available 24/7)
Website: dps.usc.edu
Non-emergency assistance or information.