

# ECO s395M

## Real Analysis

Summer 2020, Second Session – Unique IDs 79615, 79620, 79625, and 79626

Instructor: Dr. Kirk Blazek  
Lecture: M-F 9:00-10:30 online via Zoom  
Summer Office: (When campus is open) PMA (2515 Speedway) 13.140  
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Office Hours: TBA (based on student needs and timezone restrictions)

**Catalog Description:** This is an introductory course in real analysis. The main topics covered will be properties of Euclidean spaces, metric spaces, compactness, and rigorous treatments of continuity, single-variable differentiation and integration, and sequences and series of real-valued functions. Be aware that *this is a rigorous class focused on proofs and an abstract approach to mathematics.*

**Prerequisites:** There is no official prerequisite for this class, though you are expected to have some experience with undergraduate math of a level comparable to second-semester calculus. Please speak with the instructor if you are unsure whether or not you are prepared to take this course. Two of the equivalent of M341, 328K, or 325K with a grade of at least C should be sufficient.

**Text:** (Required) Lay, Stephen, *Analysis, with an Introduction to Proof*, 5th edition, Pearson, 2014.

(Recommended) Rudin, Walter, *Principles of Mathematical Analysis*, McGraw-Hill, 1976.

(Recommended) Ok Efe, *Real Analysis with Economic Applications*, Princeton, 2007.

(Recommended) Galovich, Steven, *Doing Mathematics: An Introduction to Proofs and Problem Solving*, 2nd edition, Thomson/Brooks Cole, 2007.

**Lectures:** Live lectures will be broadcast through Zoom (whose link is provided in the Canvas page for the class). For people who are unable to attend lecture or experience any issues during the live broadcast, the lecture will be recorded and posted on Canvas. If you attend the live lecture, you are welcome to ask questions through text chat.

**Piazza:** Everyone in class, whether officially registered or auditing, will be invited to a Piazza page where people are welcome to ask questions or start discussions. It is meant to be a place where questions about the class can be resolved by fellow students or the teacher. Do not feel that you need to restrict discussion on Piazza solely to homework questions or what has been talked about in lecture. You are welcome to use topics from class as a launching point for any other questions you have, though the further things stray from the topics of class, the less I can guarantee I'll be able to give a thorough answer.

**Homework:** Homework will be assigned once a week. It will not be handed in for a grade. Instead, every Monday (except the first day of class) students will take turns presenting solutions to the various assigned problems. If you are unable to attend class to give your presentation live, we can arrange an alternate time for you to show your solution. I will make efforts to allow all students to attend the meeting, so that it can be as close to a similar experience as possible for everyone.

**Grades:** Your grade for this course will be determined by your performance in homework presentations and participation in class.

**Honor Code:** The core values of the University of Texas at Austin are learning, discovery, freedom, leadership, individual opportunity, and responsibility. Each member of the University is expected to uphold these values through integrity, honesty, trust, fairness, and respect toward peers and community.

**Students with Disabilities:** If you are a student with a disability, or think you may have a disability, please contact Services for Students with Disabilities (SSD) to determine your eligibility for accommodations. You may refer to SSD's website for contact and more information: <http://diversity.utexas.edu/disability/>. If you are already registered with SSD, please deliver your accommodation letter to me as early as possible so we can discuss your approved accommodations.

**Schedule (Subject to Change):**

- **July 13th:** Chapter 1 - Introduction to Proofs
- **July 14th:** 2.1, 2.2 - Sets and Relations
- **July 15th:** 2.3, 2.4 - Functions and Cardinality
- **July 16th:** 3.1-3.2 - Induction and Ordered Fields
- **July 17th:** 3.3-3.4 - Completeness
- **July 20th:** Homework Presentations #1
- **July 21st:** 3.4 - The Topology of  $\mathbb{R}$
- **July 22nd:** 3.5-3.6 - Compact Sets and Metric Spaces
- **July 23rd:** 4.1-4.2 - Convergence of Sequences
- **July 24th:** 4.3-4.4 - Monotone Sequences, Cauchy Sequences, and Subsequences
- **July 27th:** Homework Presentations #2
- **July 28th:** 5.1 - Limits of Functions
- **July 29th:** 5.2-5.3 - Continuity of Functions
- **July 30th:** 5.4-5.5 - Uniform Continuity and Continuity in Metric Spaces
- **July 31st:** 6.1 - The Derivative
- **August 3rd:** Homework Presentations #3
- **August 4th:** 6.2-6.3 - The Mean Value Theorem and l'Hospital's Rule
- **August 5th:** 6.4 - Taylor's Theorem
- **August 6th:** 7.1-7.2 - The Riemann Integral
- **August 7th:** 7.3 - The Fundamental Theorem of Calculus
- **August 10th:** Homework Presentations #4
- **August 11th:** 8.1-8.2 - Infinite Series
- **August 12th:** 9.1, 9.2 - Uniform Convergence of Functions
- **August 13th:** 8.3, 9.3 - Applications of Power Series
- **August 14th:** Review/Makeup Day
- **August 17th:** Homework Presentations #5