

ECO s395M

Real Analysis

Summer 2023, Second Session – Unique IDs 79590 and 79591

Instructor: Dr. Kirk Blazek
Lecture: MTWTh 9:00-10:45 in BRB 1.118
Summer Office: BRB 2.130
(Rest of the year) PMA 13.140
Email: blazek@math.utexas.edu
Office Hours: MTWTh 8:00-9:00
and 12:45-1:30
TA: Ziheng Yu
TA's Office: BRB 4.134
TA's Office Hours: Tuesday and Friday 4:30-5:30pm
TA's Review Session: Friday 9:30-10:30 in BRB 1.118
TA's Email: ziheng.yu@utexas.edu

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 familiarity with proof techniques. Please speak with the instructor if you are unsure whether or not you are prepared to take this course. Two 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.

Review Sessions: Every Friday there will be a review session led by the TA. The purpose is to answer homework questions and help to explain and expand topics if you have any trouble. This is a challenging class, and the TA is there not just to talk about homework, but to give a different perspective on the topics. There can be numerous ways to approach these concepts, and the TA will be there to provide another point of view.

Homework: Problem sets will be assigned twice a week. Homework will be due on Tuesdays and Fridays (except for the first Tuesday of the course). Partial credit will be awarded, but remember that in order to receive full credit your work must be clear enough to be read and understood by others. You may collaborate on the problems, but your final write-ups must be your own work. Copied solutions are unacceptable.

Homework is to be turned in through Gradescope by 11:59pm the day it is due. Late homework is not accepted. The lowest homework grade at the end of the semester will be dropped.

Exams: This course will have a midterm and a final. The midterm will be given on July 26th in class at the usual time and the final will be on Friday, August 11th from 4-7pm. Exams must be taken with no

outside assistance, whether written, electronic, or otherwise.

Makeup Exams: If you are going to miss an exam, you must let me know *immediately* in order to discuss possible arrangements. However, if you contact me after the exam, don't expect a whole lot unless you missed the exam due to medical reasons that can be confirmed with a doctor's note.

Emergencies: If an emergency situation comes up that will result in you being unable to turn in an assignment or exam, please let me know as soon as possible so we can try to work something out.

Sharing of Course Materials is Prohibited: No materials used in this class, including, but not limited to, lecture hand-outs, videos, assessments (quizzes, exams, papers, projects, homework assignments), in-class materials, review sheets, and additional problem sets, may be shared online or with anyone outside of the class unless you have my explicit, written permission. Unauthorized sharing of materials promotes cheating. It is a violation of the University's Student Honor Code and an act of academic dishonesty. I am well aware of the sites used for sharing materials, and any materials found online that are associated with you, or any suspected unauthorized sharing of materials, will be reported to Student Conduct and Academic Integrity in the Office of the Dean of Students. These reports can result in sanctions, including failure in the course.

Class Recordings: Class recordings are reserved only for students in this class for educational purposes and are protected under FERPA. The recordings should not be shared outside the class in any form. Violation of this restriction by a student could lead to Student Misconduct proceedings.

Grading: The overall grade will be determined by the exams given during the class as well as the homework.

30%	Midterm
40%	Final Exam
30%	Homework
100%	Total

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 Disability and Access (D&A) to determine your eligibility for accommodations. You may refer to D&A's website for contact and more information. If you are already registered with D&A, please deliver your accommodation letter to me as early as possible so we can discuss your approved accommodations.

Schedule (Subject to Change):

July 10th: Chapters 1 and 2- Preliminaries and review of some fundamental concepts

July 11th: 3.1-3.2 - Induction and Ordered Fields

July 12th: 3.3-3.4 - Completeness

July 13th: 3.4 - The Topology of \mathbb{R}

July 17th: 3.5-3.6 - Compact Sets and Metric Spaces

July 18th: 4.1-4.2 - Convergence of Sequences

July 19th: 4.3-4.4 - Monotone Sequences, Cauchy Sequences, and Subsequences

July 20th: 5.1 - Limits of Functions

July 24th: 5.2-5.3 - Continuity of Functions

July 25th: 5.4-5.5 - Uniform Continuity and Continuity in Metric Spaces

July 26th: Midterm

July 27th: 6.1 - The Derivative

July 31st: 6.2-6.3 - The Mean Value Theorem and l'Hospital's Rule

August 1st: 6.4 - Taylor's Theorem

August 2nd: 7.1-7.2 - The Riemann Integral

August 3rd: 7.3 - The Fundamental Theorem of Calculus

August 7th: 8.1-8.2 - Infinite Series

August 8th: 9.1, 9.2 - Uniform Convergence of Functions

August 9th: 8.3, 9.3 - Applications of Power Series

August 10th: Review

August 11th: Final Exam