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MAT 426 Real Analysis II - Course Syllabus

David Bradley
University of Maine
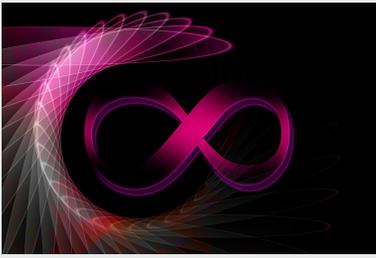
Real Analysis II
MAT 426

Professor ───────

👤 D. Bradley

🕐 Office Hours: 5–6pm MWF

📍 412 Neville Hall

☎ 207-581-3955

🔗 https://umaine.edu/
mathematics/david-bradley/

✉ bradley@math.umaine.edu

Course Info ───────

⚡ Prereq: C or better in MAT 425

📅 Mon., Wed. & Fri. through May 1

🕐 2:00 PM – 3:00 PM

📍 https://maine.zoom.us/j/
931723483

Mandated Policy Declarations

⚠ Web Link to Required Syllabus Information

Overview

Undergraduate real analysis is the classical theory of functions of a real variable: limits, continuity, differentiation, the Riemann integral, infinite sequences and series of real numbers and functions, and topology of the real line. This course is a continuation of MAT 425 (Real Analysis I). As such, we will be building on concepts introduced in MAT 425 as well as exploring new topics in real analysis in greater depth.

Reference Material

📖 Textbook: There is no required textbook. However, the following classic texts are suggested for reference.

- Walter Rudin, *Principles of Mathematical Analysis* (3rd ed.) McGraw-Hill, 1976.
- Tom M. Apostol, *Mathematical Analysis* (2nd ed.) Addison-Wesley, 1974.

🎥 Other Media: Videos of our Zoom sessions will be uploaded to Blackboard.

Course Goals

- Hone skills needed to read, write, and evaluate proofs.
- Develop fluency in the language of logic, set theory, and infinitessimal analysis.
- Reinforce concepts acquired in prior mathematics courses.
- Strengthen problem-solving skills.
- Acquire appropriate taste in posing new problems.
- Develop the facility to investigate independent lines of inquiry.

Learning Objectives

- Become adept with calculating upper and lower limits.
- Understand the Cauchy convergence criterion.
- Employ the monotone sequence theorem to prove the existence of limits.
- Understand the distinction between continuity and uniform continuity.
- Know how to determine whether a sequence of functions converges uniformly.
- Provide convergence criteria for infinite nested radicals and continued fractions.
- Gain facility with proving inequalities, and determining conditions for equality.
- Understand the distinction between algebraic and transcendental functions.
- Use properties of the elementary special functions to prove their transcendence.
- Determine characterizing properties of the classical special functions.
- Demonstrate familiarity with common pathological counterexamples in analysis.

Class Format

Course material will be presented primarily by posing problems which students will work on together both during and outside class. Any needed definitions will be provided. Students will share ideas and present solution attempts at the blackboard, and individually write-up final solutions obtained by the class. The honor system is in effect: no asking for expert help, nor hunting for solutions online or in textbooks!

Assessment

Grades will be assigned on the basis of in-class participation and written homework assignments.

Expectations

Regular attendance and active participation during class meetings is expected. Although an occasional request for a moderate extension on the deadline for submitted work will ordinarily be granted, I regret being unable to accept multiple submissions of late work, especially as the end of the semester approaches.