University of Maine – Department of Mathematics & Statistics
MAT 426 – Introduction to Real Analysis II
Spring 2025

Instructor: Jack Buttcane, jack.buttcane@maine.edu

Lecture: MWF 12:00-12:50pm in Jenness Hall 102

Credits: 3

Prerequisites: A grade of C or higher in MAT 425

This is a continuation of Real Analysis I, where we built up the underpinnings of calculus from limits up to derivatives with mathematical rigor. In this course, we will consider limits of sequences of functions and develop the Riemann integral. Following Abbott's *Understanding Analysis*, we will answer questions such as

- What does it mean for a sequence or series of functions to converge to another function?
- Given a continuous function, can we approximate it over an interval using a polynomial?
- What sorts of functions are we allowed to integrate?
- When is it safe to pull a limit inside an integral?

Time permitting, we will diverge from Abbott's book to discuss topics from calculus on $\mathbb{R}^n$ and discuss the answers to questions such as

- When does an implicit function definition $F(x, y) = 0$ actually define a function $y = f(x)$ or $x = g(y)$ around a point?
- Given a function $f : \mathbb{R}^n \to \mathbb{R}^n$, when can we find an inverse $f^{-1} \circ f = f \circ f^{-1} = \mathrm{Id}$ around some point?