MATH 207 – HONORS REAL ANALYSIS IN $\mathbb{R}^n$
FALL 2023
AMBITIOUS WEEKLY LESSON PLAN

- Week 1: Review, construction of reals (Pugh Chapter 1) Sept 27,29.
  - W: Cuts, Cauchy sequences
  - F: Metric spaces
- Week 2: Metric Space topology (Chap 2) Oct 2,4,6.
  - M: Metric Spaces, Continuity and homeomorphism
  - W: the topology of a metric space, topological description of continuity. HW 1 due
  - F: product metric, completeness, (sequential) compactness
- Week 3: Metric spaces, continued. Oct 9,11,13.
  - M: (sequential) compactness, uniform continuity and connectedness,
  - W: coverings and compactness, perfect sets HW 2 due
  - F: Differentiation in 1 variable, Darboux continuity, C^r.
- Week 4: Functions of a real variable and Function Spaces (Chapters 3-4) Oct 16,18,20.
  - M: Riemann integration, zero sets, fundamental theorem of calculus.
  - W: Uniform convergence and C^0, uniform convergence and Riemann integration HW 3 due
  - F: Arzelà-Ascoli
- Week 5: More on function spaces. Multivariable Calculus (Chapter 5) Oct 23,25,27.
  - M: Contractions and ODEs.
  - W: Differentiation in $\mathbb{R}^n$ HW 4 due.
  - F: Differentiation in $\mathbb{R}^n$, mean value theorem.
- Week 6: Multivariable Calc (Chap 5) Oct 20, Nov 1,3.
  - M: Midterm Exam
  - W: Gradient, Hessian, and higher derivatives HW 5 due.
  - F: GUEST LECTURE: C^r, Implicit and inverse functions.
- Week 7: Multivariable Calc (Chap 5) Nov 6,8,10.
  - M: Implicit and Inverse functions, the rank theorem
  - W: Lagrange multipliers and optimization. HW 6 due.
  - F: Multiple integration
- Week 8: Multivariable Calc (Chap 5) Nov 13,15,17.
  - M: Multiple integration. Fubini's theorem and Cavalieri's principle
  - W: Differential forms HW 7 due
  - F: Differential forms (wedge)
- THANKSGIVING BREAK Nov 20-24
- Week 9: Multivariable Calc (Chap 5) Nov 27, 28, Dec 1.
  - M: Differential forms (covariant derivative)
  - W: Differential forms (Stokes's)
  - F: Differential forms (div, grad, curl). HW 8 due