# Syllabus for Math 70100, Fall 2022

# August 25, 2022

This course is the first of two classes which are intended to prepare students for passing the qualifying exam in analysis. I expect to cover all the material for this course listed in the topics for the qualifying exam.

# Tentative Course Syllabus

#### Background material:

- The real number system
- Cardinality (Countable and uncountable sets)

### **Point-Set Topology:**

- Metric Spaces and Normed Linear Spaces
- Topological spaces
- Continuous maps
- Connectedness
- Nets
- Compactness
- Topology in  $\mathbb{R}^n$ : The Heine-Borel and Bolzano-Weierstrass Theorems
- Tychonoff's Theorem
- The Baire-Category Theorem

#### Function spaces:

- The uniform norm
- The Arzela-Ascoli Theorem.
- The Stone-Weierstrass Theorem
- The Urysohn Metrization Theorem

## Differentiation in $\mathbb{R}^n$ :

- Definition and elementary properties of the derivative
- Inverse and Implicit Function Theorems

## Other topics depending on time and interest:

- Elements of Functional Analysis
- Measure theory in  $\mathbb R$  and  $\mathbb R^n$
- Probability