TOPICS FOR MATHEMATICS 144, FALL 2006

I. General considerations

1. Overview of the course
2. Historical background and motivation
3. Selected problems

I I. Basic concepts

1. Topics from logic
2. Notation and first steps
3. Simple examples

I I I. Constructions in set theory

1. Boolean algebra operations
2. Ordered pairs and Cartesian products
3. Larger constructions
4. A convenient assumption

I V. Relations and functions

1. Binary relations
2. Partial and linear orderings
3. Functions
4. Constructions involving functions
5. Further constructions
6. Order types

V. Number systems and set theory

1. General considerations
2. The Natural Numbers
3. Finite induction and recursion
4. Finite sets
5. The real number system
6. Further properties of the real numbers

VI. Infinite constructions in set theory

1. Operations on indexed families
2. Infinite Cartesian products
3. Transfinite cardinal numbers
4. Countable and uncountable sets
5. The impact of set theory on mathematics
6. Transfinite recursion

VII. The Axiom of Choice and related properties

1. Some questions
2. Extending partial orderings
3. Equivalence proofs
4. Additional consequences
5. Logical consistency
6. The Continuum Hypothesis

VIII. Set theory as a foundation for mathematics

1. Simplifying axioms for number systems
2. Set theory and classical geometry