Syllabus

Analysis Qualifying Exam

These are the topics to be covered for preparation for the Qualifying Exam portion in Analysis. It is generally expected that Instructors in Math 703-704 will cover the majority of these topics in some detail.

Metric Spaces

- metric spaces, continuous functions
- separability, completeness
- compactness, Heine-Borel
- connectedness

Complex Analysis

- analytic functions: complex derivatives and Cauchy-Riemann equations, analyticity
- special functions: log (z), $e^z$, trig functions
- line integrals, Cauchy’s theorem and its consequences: Cauchy integral formula, maximum modulus, power series, Fundamental Theorem of Algebra
- classification of zeros and singularities, Laurent series
- residue theorem, evaluation of integrals and series

Lebesgue theory of Measure and Integration

- outer measure, measurable sets, measure spaces, complete and regular measures
- integration, Fatou’s lemma and convergence theorems
- extension theorem, product measure and Fubini’s theorem, Lebesgue-Stieltjes integral
- absolute continuity, Vitali’s lemma, differentiation theory for monotone functions and integrals, functions of bounded variation
- Egorov and Lusin Theorems
- definition of $L^p$, Hölder and Minkowski inequalities, completeness of $L^p$, approximation by step and continuous functions

Reference Texts (listed alphabetically by author):


Effective January 2020 examination.