MA504 REAL ANALYSIS

Instructional Format: Lecture meets 3 times per week for 50 minutes per meeting for 16 weeks. Credits: 3.00

Text: W. Rudin, *Principles of Mathematical Analysis*, Third Edition, McGraw-Hill, New York, 1976

Description: Completeness of the real number system, basic topological properties, compactness, sequences and series, absolute convergence of series, rearrangement of series, properties of continuous functions, the Riemann-Stieltjes integral, sequences and series of functions, uniform convergence, the Stone-Weierstrass theorem, equicontinuity, and the Arzela-Ascoli theorem.

Prerequisites: Upper division undergraduate level course work in Mathematics, General or Upper division undergraduate level course work in Engineering, General; for a total of two courses. Authorized equivalent courses or consent of instructor may be used in satisfying course pre- and co-requisites.

Topics

- Chapter 1. The Real and Complex Number System
  - Real number system - (Emphasize inf, sup)
  - Extended real number system
  - Euclidean spaces
- Chapter 2. Basic Topology
  - Finite, countable and uncountable sets
  - Metric spaces (Only a few special examples)
  - Compact sets
- Chapter 3. Numerical Sequences and Series
  - Convergent sequences
  - Subsequences
  - Cauchy sequences
  - $\limsup x_n$ and $\liminf x_n$
  - Series
  - Series with many terms (comparison test)
  - Absolute and conditional convergence
  - Rearrangements
- Chapter 4. Continuity
  - Limits of functions
  - Continuous functions
  - Continuity and compactness
  - Intermediate Value Theorem
- Chapter 6. The Riemann-Stieltjes Integral
  - Definition and existence
  - Properties
  - Integration and differentiation

- Chapter 7. Sequences and Series of Functions
  - Uniform convergence
  - Uniform convergence and continuity
  - Uniform convergence and integration
  - Uniform convergence and differentiation
  - Equicontinuous families of functions
  - Stone-Weierstrass Theorem
- Optional Topics.
  - Sets of Lebesgue measure zero
  - Characterization of Riemann integrable functions bounded and continuous a.e.
  - Differentiability a.e. of monotone functions