

Math 362- Real Analysis II  
Department of Mathematics  
Morehouse College  
Fall 2007

**College Catalog Description:** Real Analysis II is a continuation of Real Analysis I; the theory of multivariable calculus; sequences of functions and series of functions; uniform convergence; transformations; differentiation in  $\mathbb{R}^n$ ; implicit and inverse function theorems; integration in  $\mathbb{R}^n$  and Jacobian.

**Prerequisites:** Math 272 and Math 361 with a grade of “C” or better

**Required textbook:** The Elements of Real Analysis, 2nd Ed., by Robert G. Bartle

**Topical Outline** (sections to be covered from Bartle)

- 17. Sequences of functions; Convergence; Uniform Convergence; Cauchy Criterion for Uniform Convergence
- 21. Linear functions; Matrix Representation; Norm
- 24. Sequences of continuous functions; Interchange of Limit and Continuity
- 34. Convergence of infinite series; Cauchy Criterion; Absolute Convergence
- 35. Tests for absolute convergence; Comparison Test; Limit Comparison Test; Root Test; Ratio Test; Integral Test
- 36. More series tests: Dirichlet’s Test; Alternating Series Test
- 37. Series of functions; Absolute and Uniform Convergence; Cauchy Criterion; M-Test; Power Series; Differentiation Theorem; Uniqueness Theorem
- 39. The derivative in  $\mathbb{R}^p$ ; Partial Derivative; Directional Derivative; Jacobian
- 40. Chain Rule and Mean Value Theorem; Interchange of the Order of Differentiation; Higher Derivatives; Taylor’s Theorem
- 41. Implicit Function Theorem; Injective, Surjective Mapping Theorems; Inversion Theorem
- 43. The integral in  $\mathbb{R}^p$ ; Content Zero; Riemann Sums and the Integral; Cauchy Criterion; Properties of the Integral; Integrability Theorem
- 44. Content and the integral; Sets with Content; Further Properties of the Integral; Iterated Integrals
- 45. Transformations of sets and integrals; Images of Sets with Content; Transformation by Linear Maps; The Jacobian Theorem; Change of Variables Theorem.