

**Syllabus**  
**Math 01.511 Real Analysis II**

**CATALOG DESCRIPTION:**

**Math 01.511 Real Analysis II 3 s.h.**

(Prerequisite Math 01.510)

This course is a continuation of Real Analysis I and covers Riemann-Stieltjes integration; elements of measure theory and Lebesgue integration. This course may not be offered annually.

**OBJECTIVES:**

The purpose is to provide students an opportunity to study the drawbacks of the Riemann-Stieltjes integral and introduce them to measure theory and the Lebesgue integral.

**CONTENT:**

**1. The Riemann-Stieltjes Integral**

- 1.1 Definition and properties
- 1.2 Drawbacks of the Riemann-Stieltjes Integral

**2. Measurable Sets**

- 2.1 The outer measure and measurable sets
- 2.2 Properties of measurable sets such as countable additivity
- 2.3 Borel sets and the Cantor set.
- 2.4 Lebesgue measure for bounded and unbounded sets

**3. Measurable Functions**

- 3.1 Definition of measurable functions
- 3.2 Preservation of measurability for functions
- 3.3 Simple functions

**4. The Lebesgue Integral**

- 4.1 The Lebesgue Integral for bounded measurable functions
- 4.2 Simple functions
- 4.3 Integrability of bounded measurable functions
- 4.4 Elementary properties of the integral
- 4.5 The Lebesgue Integral for unbounded functions

## 5. Convergence and the Lebesgue Integral

5.1 Convergence theorems

5.2 A necessary and sufficient condition for Riemann Integrability

5.3 Ergoff's and Lusin's theorems

### TEXTS:

The following are indicative of texts suitable for this course:

1) Wilcox H. and Myers, D., AN INTRODUCTION TO LEBESGUE INTEGRATION AND FOURIER SERIES, Dover Publishing Company, NYC, 1994.

2) Goldberg, Richard, METHODS OF REAL ANALYSIS, 2<sup>nd</sup> edition, John Wiley & Sons, 1976