CAL POLY

September 2009

MATH 550 Real Analysis

1. Catalog Description

MATH 550 Real Analysis (4)

Introduction to Lebesgue measure and integration, convergence theorems, L_1 spaces, Radon-Nikodym Theorem and Fubini's Theorem. 4 seminars. Prerequisite: Satisfactory completion of the Graduate Written Examination in Analysis or consent of the Graduate Committee.

2. Required Background or Experience

Satisfactory completion of the Graduate Written Examination in Analysis.

3. Learning Objectives

The student should:

a. Develop an understanding of the concepts of measure, measurable functions and the Lebesgue integral.
b. Develop an understanding of the shortcomings of the Riemann integral and the need for the Lebesgue integral.
c. Gain a knowledge of various types of convergence, several convergence theorems and their applications.

4. Text and References

To be selected by instructor.

5. Minimum Student Materials

Paper, pencils and notebook.

6. Minimum University Facilities

Classroom with ample chalkboard space for class use and library facilities.

7. Content and Method

Topic	Lectures
a. Real numbers, extended reals. Sequences, limits, $\overline{\lim}$, $\underline{\lim}$. Open and closed sets, continuous functions and Borel sets.	6
b. Outer measure, measurable sets and Lebesgue measure. Non-measurable sets, measurable functions, Lusin's and Egoroff's theorem.	10
c. The Lebesgue integral for simple bounded, non-negative and measurable functions. Convergence theorems: Monotone convergence, Fatou's lemma. Bounded convergence and dominated convergence.	9
Total	25

If time permits, topics in differentiation and/or the Radon-Nikodym theorem, Fubini's theorem.

Method

Student recitation, homework assignments, short tests on judgment and problem solving and scheduled examinations as determined by the individual instructor.

8. Methods of Assessment

Exams, homework and possibly student presentations.