[A-3]COURSE SYLLABUS

1. Course Description (Approximately 100 words)

Modern mathematics and physics rely on our ability to be able to solve equations, if not in explicit exact forms, then at least in being able to establish the existence of solutions. To do this requires a knowledge of so-called ``analysis'', which in many respects is just Calculus in very general settings. The foundations for this work are commenced in Real Analysis, a course that develops this basic material in a systematic and rigorous manner in the context of real-valued functions of a real variable.

2. Course Goals and Objectives (Approximately 100 words)

To introduce students to the fundamentals of mathematical analysis and to reading and writing mathematical proofs. At the end of this course, students should: understand the axiomatic foundation of the real number system, in particular the notion of completeness and some of its consequences; understand the concepts of limits, continuity, compactness, differentiability, and integrability, rigorously defined; be able to use results and techniques involving these concepts to solve a variety of problems, including types of problems that they have not seen previously; know how completeness, continuity, and other notions are generalised from the real line to metric spaces; and appreciate the Contraction Principle in abstract metric space theory as a powerful tool to solve concrete problems, especially in differential equations. Students should also have attained a basic level of competency in developing their own mathematical arguments and communicating them to others in writing.

3. Textbook (Title, Author, Publisher, Year of Publication, etc.)

Belding & Mitchell: "Foundations of analysis";

4. Reference

Fitzpatrick: "Real analysis";
Gaughan: "introduction to analysis";

5. Course Requirements and Grades

MID-TERM - 40%
MAIN EXAM - 60%

6. Course Calendar

Week	Main Content
1	Intro to analysis
2	The Real Number System: Order Axioms
3	The Complex Numbers, Briefly
4	The Completeness Axiom for the Real Numbers
5	Countability
6	Sequences
7	Mid-term exam
8	Interaction of Limits and Inequalities; the Algebra of Limit
9	Monotonic Sequences
10	Subsequences, the Bolzano{Weierstrass Theorem
11	Convergence of Series
12	Convergence of Series continued
13	Power Series
14	Main Exam