STUDENT SYLLABUS

FOR

MATH 3333, INTERMEDIATE ANALYSIS

PREREQUISITE: MATH 2433

TEXT: "Analysis with an Introduction to Proof", Third Edition, by Steven R. Lay, Prentice-Hall, 2001.

MATH 3333 is the first rigorous theorem/proof-type course in analysis at the University of Houston. Its role is to prepare students for advanced mathematics, especially for all math courses in analysis numbered 3334 and higher. The goal of the course is to teach students mathematical reasoning and the construction of proofs in the environment of $\mathbb{R}^1$. Topics covered include the topology of $\mathbb{R}^1$, convergence and limits, and the proofs of well-known calculus theorems such as the Mean Value Theorem, the Intermediate Value Theorem, the Inverse Function Theorem in $\mathbb{R}^1$, and the Fundamental Theorem of the Calculus. Some instructors may require students to write homework solutions at the board that will be critiqued by their classmates and/or the instructor.

SUGGESTED SYLLABUS

Chapter 3: "The Real Numbers" (Natural numbers and induction, ordered fields, the Completeness Axiom, topology of the real numbers, compact sets--omit Metric Spaces)

Chapter 4: "Sequences" (convergence, limit theorems, monotone sequences and Cauchy sequences, subsequences)

Chapter 5: "Limits and Continuity" (limits of functions, continuous functions, properties of continuous functions--cover uniform continuity in the context of Chapter 7 and omit continuity in Metric Spaces)

Chapter 6: "Differentiation" (The derivative, the Mean Value Theorem; include l'Hopital's Rule and Taylor's Theorem as time permits)

Chapter 7: (as time permits) "Integration" (The Riemann integral, properties of the Riemann integral. The Fundamental Theorem of the Calculus)

SUGGESTED HOMEWORK PROBLEMS

Assignment #1: 10.5,10.7,10.13,10.16 (b)

Assignment #2: 11.3 (a) - (c) , 12.1 (a) -(c), 12.3 (e) (g) (i) 12.6

Assignment #3: 13.2 (a) (b), 13.3 (a)- (c) ,13.4 (a)- (c) , 13.5 (a)- (c) ,13.7

Assignment #4: 13.13, 14.4,16.2,16.4 (c) - (e)

Assignment #5: 17.5 (b),(f),(I),17.6 (a),(b),17.7.17.14

Assignment #6 18.3 (a) (d),18.4 (a)-(c),

Assignment #7: 19.2 (a)-(c),19.4,20.4

Assignment #8: 21.3,21.5,21.6.22.4,22.6

Assignment #9: 25.1,25.6,25.7(a),(c),26.5 (a),(d),(j),26.15

Assignment #10: 27.5,28.4,29.3,29.10,30.4,30.10