Real Analysis.

Fall 2007.

Room 1013, Warren Weaver Hall

Mondays and Wednesdays 5.10-6.25 PM.

Approximate outline of the course.

Text: Royden Real Analysis.
Available at the Campus Book Store.

Week 1. Real Numbers as a set. Algebraic and analytical properties. Arithmetic operations. Limiting operations.

Week 2. Open and closed sets. Lindelof and Heine-Borel properties. Functions. Continuity of functions. Connectedness.

Integration. Riemann integral of continuous functions. Length of intervals and other sets. Borel sets.

Week 3. Fields, σ-fields, Measures, countable additivity. Examples.

Extension Theorem. Construction of Lebsgue measure.

Week 4. Integration of Bounded measurable functions. Bounded Convergence Theorem.

Integrability. Dominated Convergence Theorem. Transformations.

Week 5. L_p spaces. Metric Spaces, Banach Spaces, Hilbert Spaces

Toplogical Spaces, Product Spaces, Continuous functions,

Week 6. Compactness, Separability,

Metrization

Week 7. Stone-Weierstrass Theorem.

Riesz Theorem for $C(X)$.

Week 8. Hahn-Banach theorem, Applications.

Radon-Nikodym theorem. Absolute Continuity.

Week 9. Functions of bounded variation. Maximal functions. Differentiability on R.

Riesz theorems for L_p spaces.

Week 10. Product Measures. Fubuni's Theorem.

Infinite product measures.

Week 11. Conditional distributions. Disintegration of measures.

Problems will be assigned every week and answers will be due the following week on Monday or on Wednesday if Monday is a Holiday. The problems will be posted on the web.