# Math 365-366: Honor Analysis.

Department of Mathematics, University of Notre Dame

In Math 365-366, we will cover the following material.

Real and complex number systems, Euclidean spaces.

Basic topology – Finite, countable, and uncountable sets, metric spaces, compact sets, perfect sets, connected sets.

Sequences and series – convergence, test for convergence, upper and lower limits, summation by parts, absolute convergence, multiplication of series, rearrangement.

Continuity and differentiation – using open sets, compact sets to characterize continuity, continuity and connectedness, monotone functions, mean value theorems, L'Hospital's rule, Taylor's theorem.

Riemann-Stieltjes integrals – definitions and major theorems.

Sequences and series for functions – uniform convergence, continuity, integration and differentiation; equicontinuity, Stone-Weierstrass theorem.

Functions of several variables – differentiation, inverse and implicit function theorem.

Integration and differential forms – differential forms, partitions of unity, simplexes and chains, Stockes' theorem.

## Fall 1996 – Honor Analysis I

Instructor: Bei Hu
Office: Math 219
Phone: 631-5352(O) 273-8545(H) WWW: http://www.nd.edu/~b1hu/
Class meets MWF 1:55 – 2:45 at Math 326

**Text book:** Walter Rudin: Principle of Mathematical Analysis.

**Final exam:** December 18, 1996, 8:00 a.m – 10:00 a.m.

**Grade:** Test I, Test II, Test III, 100 points each. Final is worth 150 points. Homeworks will be scaled to a total of 50 points. The Grade of the

course is based on a total of 500 points. The schedule for three exams will be announced in class and it is **your** responsibility to take all the exams.

**Homeworks:** You may seek help from others for your homeworks, after trying on your own. Homeworks more than 7 days late will not be accepted.

**Help:** Please seek help immediately after you encounter difficulties. You may stop by my office at any time you see me there. You may call me at Office or Home for help.

**Materials covered in Fall 1996:** Everything in Chapters 1, 2, 3, 4. Basic topology – Finite, countable, and uncountable sets, metric spaces, compact sets, perfect sets, connected sets.

Sequences and series – convergence, test for convergence, upper and lower limits, summation by parts, absolute convergence, multiplication of series, rearrangement.

Continuity and differentiation – using open sets, compact sets to characterize continuity, continuity and connectedness, monotone functions.

**Comments on the book:** The book has a good selection of materials and provides a very solid training for mathematical analysis; it is a good book for Honor's students. However, the book is "compact", and for the current level students, many proofs of the theorems require extensive explanation; but this is exactly where the role of instructor can play.