Math 5200-Real Variables.
Spring 2006

Instructor: Hakima Bessaih, 210 Ross Hall, Ext. 6213

URL: http://www.uwyo.edu/bessaih/

Office Hours: MWF 11:00-12:00am and by appointment.

Class time & room: MWF 1:10-2:00 pm in RH 308 .

Text. Real Analysis, 3rd edition, by H. L. Royden.

Reference material.

- Principles of real analysis, 2nd edition, by Charalambos D. Aliprantis and Owen Burkinshaw.
- Principles in real analysis, A Workbook with Solutions, by Charalambos D. Aliprantis and Owen Burkinshaw.
- Real Analysis Modern Techniques and their Applications, by Gerald B. Folland.
- Measure theory, by Paul R. Halmos.

Prerequisites. Mathematics 4200 and 4205 or introduction to set theory and point set topology and exposure to the notions of sequences and series, continuity, differentiability, Riemann-Stieljes integral and sequences and series of functions.

Course Description. In this course we will develop the modern techniques of real analysis in $\mathbb{R}^n$ and consider some of its applications. We will define and study the measures of sets in $\mathbb{R}^n$. Measurability and integration of function will be studied with the emphasis on Lebesgue theory. Next, we will develop the differentiation theory of a measure with respect to another measure and apply it to the Lebesgue measure. Using the above integration and differentiation theory we will develop the elements of functional analysis

and the basic theory of L^p spaces and as permits will provide with some applications in Probability theory.

Tentative list of topics.

Topics	**Sections**
The Real Number System	2.5-2.7 (1 weeks)
Lebesgue Measure	3.1-3.6, 11.1-11.6 (4 weeks)
The Lebesgue Integral	4.1-4.5 (3 weeks)
Differentiation and Integration	5.1-5.5 (2 weeks)
The classical Banach Spaces	6.1-6.5 (2 weeks)
Some Applications	(2 weeks)

Grading Policy.

- **Final exam:** The final exam takes place **on 03-May-2006, 1:15-3:15pm RH 308**. The final exam counts for **25%** of the final grade.
- **Midterms:** There will be one midterm exam tentatively scheduled for **10-Mar-2005**. The midterm counts for **25%** of the final grade.
- **Homework:** There will approximately 6 to 7 homework assignments to be downloaded from the course home page. Homework counts for **50%** of the final grade.
- **Attendance:** Every student is expected to attend the lectures.
- **Grading scheme for the final grades:** Grade A: 90-100, Grade B: 80-89, Grade C: 70-79, Grade D: 60-69, Grade F:<60
- **Comments:** I encourage you to work in groups outside of the classroom, you can discuss the text and the lectures. However, the homework assignments are supposed to be an individual task.

The information in this syllabus is subject to change. If there are changes, they will be announced repeatedly in class.