

MATHEMATICAL ANALYSIS II

MATH 4240/8246

Course Description:

Provides a theoretical foundation for the concepts of elementary calculus. Topics include differentiation and Riemann-Stieltjes Integration, sequences and series of functions, uniform convergence, power series, functions of several variables, Implicit Function Theorem. **3 credits**

Prerequisites:

MATH 4230/8230

Overview of Content and Purpose of the Course:

To provide the students with a theoretical foundation for the concepts of advanced calculus and to provide the background for more advanced courses in analysis.

Anticipated Audience/Demand:

The course is intended for both undergraduate and graduate students.

Major Topics:

I. Riemann-Stieltjes integration in $\mathbb{R}$.

- a) Existence criteria for the integral
- b) Further properties of the integral
- c) Improper and infinite integrals
- d) Uniform convergence and infinite integrals

II. Sequences and series of function (in $\mathbb{R}^p$, but primarily in $\mathbb{R}$)

- a) Pointwise convergence
- b) Uniform convergence
- c) Consequences of uniform convergence
- d) Power series (including Taylor)

III. Differentiation in $\mathbb{R}^p$

IV. Implicit and rank theorem

V. Integration in $\mathbb{R}^p$

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- Limit superior and inferior
- Stone-Weierstrass approximation theorems
- Cesaro summation and iterated limits

Methods:

The course will be presented in the lecture/discussion form with the students free to ask questions at any time. The students are encouraged to ask questions on the lecture or on the problem assignments that are given or on any of the problems in the book.

Textbook:

Rudin, Walter. *Principles of Mathematical Analysis*, 3rd ed. New York: McGraw-Hill Education, 1976.

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