Department of Mathematics

Course Profile

Course Number: MATH 311	**Course Title: Introduction to Real Analysis**
Required / Elective: Elective	**Prerequisite:** There is no official pre-requisite for this course**.** But the student must be familiar with the two semesters materials of calculus
Catalog Description: Algebra of sets, the axiom of choice, countable sets, relations and equivalences, partial orde-rings and the maximal principle. Outer measure , measurable sets and Lebesgue measure, measurable functions. The Lebesgue integral and its properties.	**Textbook / Required Material:** Real Analysis, H.L. Royden, 3rd Edition, Prentice Hall, 1988.

Course Structure / Schedule: (3+0+0) 3 / 6 ECTS

Extended Description:

Some facts from naive set theory: i) algebra of sets ii) functions and equivalent sets; iii) countable and uncountable sets. Axioms of real numbers. The extended system of real numbers. Limits and cluster points. Open and closed sets of real numbers. Coverings. Bolzano-Weierstrass theorem. Relations and equivalences, partial ordering and the maximal principle. Outer measure of point sets. Properties of outer measure. Measurable sets. Properties of measurable sets. Measurable functions and properties. The Lebesgue integral and properties. Limit properties of Lebesgue integral. Lebesgue and Riesz theorems.

Design content: None	**Computer usage:** No particular computer usage required.

Course Outcomes: By the end of the course the students should be able to:

1. understand fundamentals of real analysis, naive set theory, axiomatic method and shortcomings of the Riemann integral **[6],**
2. work with Lebesgue integral and to read and write proofs mathematical statements on moderate level **[1, 6].**

[1] demonstrate the ability of solving problems by using techniques from calculus, linear algebra, differential equations, probability and statistics,

[6] have a basic knowledge of the main fields of mathematics, including analysis, algebra, differential equations, differential geometry.

Recommended reading: Any textbook on real analysis.

Teaching methods: Pre-readings and lectures.

Assessment methods: Midterm exams, final exam

Student workload:

Preparatory reading	60 hrs
Lectures	45 hrs

Discussions and pre-reading	18 hrs
Homework	20 hrs
Midterm Exams	4 hrs
Final Exam	3 hrs
TOTAL ……	**150 hrs … to match 25 x 6 ECTS**

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