Real Analysis - Course Syllabus

Course Number: AMCS 290B

Course Title: Real Analysis

Academic Semester:	Spring	**Academic Year:**	2015/ 2016
Semester Start Date:	Jan, 24, 2016	**Semester End Date:**	May, 19, 2016

Class Schedule: Monday/ Thursday, 14:30-16:00

Classroom Number:

Instructor(s) Name(s): Athanasios Tzavaras
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Teaching Assistant name:
Email:

Office Location: Al-Khawarizmi Applied Math Building (Building 1), Room 4418
Office Hours: By appointment

COURSE DESCRIPTION FROM PROGRAM GUIDE

Prerequisites: Advanced and Multi-variable calculus: This course is an introduction to measure and integration theory, the elementary theory of metric spaces, and applications to the approximation of real valued functions. It is intended as an introductory graduate level course for the Applied Mathematics program and will be of interest to Statistics and students from the Electrical Engineering and possibly other programs. The course has been introduced to be one (1) of the 5 core courses of the AMCS-Applied Mathematics program.

COMPREHENSIVE COURSE DESCRIPTION

Review of continuous functions, Metric spaces, Sequences of functions, uniform convergence, the Weierstrass approximation theorem, Compactness in metric spaces, the Ascoli-Arzela theorem. Lebesgue integral: σ-algebras, measurable functions, measure, integrable functions, Lp spaces, modes of convergence, decomposition of measures (Radon-Nikodym), Generation of measures (Lebesgue, Lebesgue-Stieljes), Product measures (Tonelli, Fubini Theorems), Differentiation, Functions of bounded variation, Approximation via convolutions, Fourier Series, Convergence of Fourier series for square integrable and for BV functions.

GOALS AND OBJECTIVES

For the students to develop a strong foundation in Real Analysis and the theory of integration.

REQUIRED KNOWLEDGE

Undergraduate courses in Advanced and in Multi-variable Calculus.

REFERENCE TEXTS

Walter Rudin, Principles of Mathematical Analysis, McGraw Hill, 1976.

Robert Bartle, The elements of integration and Lebesgue measure, 2nd edition, Wiley Classics Library, 1995.

Gerald Folland, Real Analysis, Modern Techniques and Their Application, 2nd edition, Wiley, 1999.

METHOD OF EVALUATION

Percentages %	**Graded content** (Assignments, Oral quizzes, Projects, Midterm exam, Final Exam, Attendance and participation, etc)
20%	**Homework**
40%	**Midterm**
40%	**Final examination**

COURSE REQUIREMENTS

Assignments

There will be assigned readings and homework assignments to be turned in.
Homework assignments will consist of exercises of applying the theorems developed in class, and of assignments on proving theoretical results using the material develoed in class or found in the References.

Course Policies

Late assignments will be accepted but will be calculated a 30% penalty.
All students are required to attend the class and take class notes since this course will not follow a single textbook

NOTE

The instructor reserves the right to make changes to this syllabus as necessary.