

**Math 401**  
**Introduction to Functional analysis**  
FALL 2009

**Instructor:** Aydin Aytuna, FENS 2057, email: aytuna@sabanciuniv.edu

**Time and Location:** 8:40 am - 9:30 am M Fac.of Engin. and Nat. Sci. L061

**Office Hours:** 8:40 am - 10:30 am W Fac. of Engin. and Nat. Sci. L056  
10:40 am - 12:00 am W

**About the course**

Functional Analysis is a mathematical discipline that was developed in the first part of the 20th century. It treats the concepts and methods of classical analysis and related branches of algebra/geometry in an abstract setting, and extends these ideas to more general objects. The most important feature of the theory is the investigation of *spaces* of functions and their *transformations* rather than the investigations of individual functions/ relations and equations connecting them. The generality of the approach in the investigations usually reveals more deep and concrete connections/relations since ,in the words of Kantorovich, ”.. the insignificant details of individual problems are brushed aside and no longer obscures the essence of the matter”. Thus the theory makes it possible to approach, from a unified point of view, problems of analysis that at first sight appear quite different. During the last decades the results and ideas of functional analysis were successfully used in different branches of pure and applied mathematics and is now considered an indispensable part of advanced undergraduate/beginning graduate mathematical curriculum.

The aim of this introductory course is to present the basic fundamental results/techniques of functional analysis with as minimal mathematical prerequisites as possible.

**Prerequisites:**

Introductory course on mathematical analysis (e.g. Math 301)

Linear Algebra

Although integration theory ( e.g. Math 401) will not be assumed, it will be useful in understanding some examples/exercises.

**Resources:**

E. Kreyszig, *Introductory Functional Analysis with Applications* John Wiley

&Sons.Inc. 1978

M. Schenchter, *Principles of Functional Analysis* Graduate studies in mathematics  
Volume 36 AMS 2002

**Grading:**There will be weekly assignments, a midterm exam and a final. They will count toward the grade as follows.

Assignments	60%
Midterm	15%
Final	25%.