

# COURSE ANNOUNCEMENT

## MTH 630 Functional Analysis II – Fall 2010

Instructor: Orlando Merino, Lippitt 101c, 874-4442, [merino@math.uri.edu](mailto:merino@math.uri.edu)

Meets: MW 3:00 pm to 4:15 pm

Location: Lippitt Hall, room 201

Prerequisites MTH513

MTH630 Functional Analysis II is designed for students in mathematics, natural sciences, computer science, engineering, and other fields. It is a good course for graduate students of engineering and basic sciences who would like to strengthen mathematical skills and knowledge.

The main topic of MTH629 is normed vector spaces, linear and nonlinear operators, and applications to mathematical optimization. Some specific topics we will discuss are:

Normed vector spaces. Duality. Linear Functionals. Hahn-Banach Theorems, extension and geometric forms. Linear Operators Optimization of Functionals. Gateaux and Frechet derivatives. Convexity. Primal and dual optimization problems. Positive cones and (partially) ordered vector spaces. Karush-Kuhn-Tucker Theorem. Newton's method and other methods for solving equations. Nonlinear equations. Fixed point theory. Convex optimization. Semidefinite programming and linear matrix inequalities, Sums of squares and application to Lyapunov functions.

There is some flexibility in the choice of topics, and I plan to include certain topics depending on interest of the registered students.

The requirements of the course are graduate level linear algebra. Evaluation is based on homework, and a project which is to be presented at the end of the semester.

We will mostly follow the text *Optimization by Vector Space Methods*, by D. Luenberger. Also, I will add supplementary material.

Finally, I want to mention that I have designed this second course in Functional Analysis so that a student may take it without taking previously MTH629 Functional Analysis I. Please send me a note ([merino@math.uri.edu](mailto:merino@math.uri.edu)) if you are interested in knowing more about MTH630.