Optimization Models in Finance (26:711:564)

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Objectives

The objective of this course is to introduce models and computational methods for static and dynamic optimization problems occurring in finance. Special attention will be devoted to portfolio optimization and to risk management problems.

Time and Place

Tuesday 2:30—5:20 **1WP 512** (Newark Campus)

Office Hours

Tuesday 12 noon —1 pm or by appointment. E-mail: rusz@business.rutgers.edu

Course Materials

Lecture Notes.
D.G. Luenberger, *Investment Science*, Oxford University Press, New York 1998
A. Ruszczynski*, Nonlinear Optimization*, Princeton University Press, 2006.

The books are **not required**, but you may consult them if you want to deepen your knowledge in some areas.

Graded Work

Homework will be assigned twice a month as a means to help you understand the concepts and to give you practice in applying them. Homework assignments and other information can be obtained from the course Blackboard page. There will be one midterm exam and a final exam. The final grade will be derived as follows:

1. Homework assignments (30%)
2. Midterm exam (30%)
3. Final exam (40%)

The approximate grade cutoff points are: **C** (50%), **C+** (60%), **B** (70%), **B+** (80%), **A** (90%), but the final grade is at the discretion of the professor. It may be higher or lower than the grade following from these thresholds.

Plan of Lectures

Week	Topic
1	Introduction to optimization models.
2	Elements of convex analysis.
3	Linear programming models. Optimality.
4	Duality in linear programming. Application to asset pricing.
5	Nonlinear programming models. Optimality.
6	Duality in nonlinear programming. Economic interpretation of Lagrange multipliers.
7	The portfolio selection problem. Two-fund and one-fund theorems.
8	Value at risk.
9	Theory of mean-risk optimization models.
10	Average Value at Risk.
11	Coherent measures of risk.
12	Stochastic dominance.
13	Optimization with stochastic dominance constraints.
14	Information on professional optimization software

Handouts and Homework will be available on blackboard.rutgers.edu