26:711:555 Stochastic Programming

Instructor: Andrzej Ruszczyński (MSIS department), web: www.rusz.rutgers.edu

Time and place: Wednesday 2:30—5:20, room 3031, RBS Building, Livingston Campus, 100 Rockafeller Road, Piscataway.

Topics:

1. Modeling uncertainty and risk. Examples
2. Optimization problems with probabilistic (chance) constraints. Convexity theory.
3. Numerical solution of optimization problems with probabilistic constraints.
4. Two-stage stochastic programming problems. Basic properties and optimality conditions.
5. Decomposition methods for two-stage problems.
6. Multistage (dynamic) stochastic programming problems.
7. Decomposition methods for multistage problems.
8. Sample-based optimization.
9. Stochastic algorithms.
10. Introduction to risk-averse optimization: basic models.
11. Optimization of risk measures.
12. Stochastic dominance constraints.
13. Dynamic risk measures. Time consistency.
14. Risk-averse Markov decision processes.

Textbooks:

Main:

1. A. Shapiro, D. Dentcheva, A. Ruszczyński: *Lecture Notes on Stochastic Programming Modeling and Theory*, SIAM and MPS, 2009 (free on-line copy available)

2. A. Ruszczyński and A. Shapiro: *Stochastic Programming, Handbook in Operations Research and Management Science*, Elsevier Science, Amsterdam, 2003

Supplementary:

3. J. R. Birge, F. Louveaux: Introduction to Stochastic Programming, 2nd Ed., Springer, 2011

4. A. Prékopa: Stochastic Programming, Springer 1995

Grading: The final grade will be based on homework and project assignments, involving theoretical problems and computational projects.