

OR 750: Stochastic Optimization Spring 2015

Location: Nguyen Engineering Building 1110

Time: Tuesday 4:30 – 7:10 PM

Instructor: Bjorn Berg

Office: Nguyen Engineering Building 2240

Email: bberg2@gmu.edu

Office Hours: TBA, by appointment

Prerequisites: OR 541, OR 542, and one OR Methods course. You should be proficient in a programming language (e.g., C++, Java, Python) and familiar (or able to become so) with a math programming solver (e.g., Cplex, Gurobi).

Text Book: Birge, John R., and François Louveaux. *Introduction to stochastic programming*. Springer Science+ Business Media, 2011.

Note: An electronic version of the book is available through the university library website.

Throughout the semester we will be reading research papers to supplement the material in the text book. Papers and other course material will be provided on Blackboard.

Objectives: This course will provide students with an introduction to stochastic optimization, more specifically, stochastic programming. Through taking this course, you will:

- Develop a familiarity with, and an intuition for, modeling optimization problems under uncertain conditions
- Examine the problem structure and properties of stochastic programs from both a theoretical and a practical perspective
- Implement advanced solution methods
- Become familiar with the “state of the art” of stochastic programming

Schedule: The following is a tentative weekly schedule and is subject to change.

January 20 - Introduction, Modeling

January 27 - LP and Probability Review, Modeling and Stochastic Programming Examples

February 3 - Two-stage Stochastic Programs

February 10 - Modeling Chance Constraints, Stochastic IP, and Multi-stage SP

February 17 - Value of Stochastic Optimization, L-shaped Method

February 24 - Other Solution Methods, Network Problems

March 3 - Regularized Decomposition, Solvers, Catch up

March 10 - No Class

March 17 - Sampling Methods

March 24 - Stochastic Integer Programs

March 31 - Multi-stage Stochastic Programs
April 7 - Bounding Methods
April 14 - Lagrangian Methods
April 21 - Stochastic Decomposition
April 28 - Probabilistic Constraints
Final Exam Time: May 12 - Project Presentations

Grading:

40% Homework Assignments
40% Research Project
20% In-class Participation and Presentations

Homework Assignment Information:

There will be approximately 4-5 assignments throughout the semester. Submissions (hard copy or via Blackboard) are due prior to the beginning of class on the due date. There will be a 20% grade reduction for each late day.

Include the following in your homework assignments:

- Your name and the assignment number
- Legibly written answers
- Problem definition
- Assumptions made
- Methods used
- Results and conclusions in words
- Some of the assignment problems will require the use of programming and/or a solver. For these problems please be sure to submit a thoroughly commented version of your code.

While I encourage you to discuss ideas related to the homework assignments with me or your classmates, every student is expected to submit their own work individually.

Note: The numerical “answers” you get are important but the focus of the grading is on the approach to the solution and your understanding of the fundamental theory that underlies the solution. Therefore you must show all of your work leading up to the final solution. Points are allocated for each step of the solution process.

Academic Integrity Policy:

GMU is an Honor Code university; please see the Office for Academic Integrity for a full description of the code and the honor committee process. The principle of academic integrity is taken very seriously and violations are treated gravely. Dishonesty is unfair to everyone, especially those who do their work honestly. Academic dishonesty will be fully prosecuted. All work turned in with your name is assumed to be only your own work (including homework assignments). If what you turn in duplicates others, then it is cheating (regardless of who copied who). When in doubt (of any kind) please ask for guidance and clarification.

Disability Accommodations

If you have a documented learning disability or other condition that may affect academic performance you should: 1) make sure this documentation is on file with Office of Disability Services (SUB I, Rm. 4205; 993-2474; <http://ods.gmu.edu>) to determine the accommodations you need; and 2) talk with me to discuss your accommodation needs.

Email Communication

Students must use their MasonLive email account to receive important University information, including messages related to this class. See <http://masonlive.gmu.edu> for more information.

Mason Diversity Statement

George Mason University promotes a living and learning environment for outstanding growth and productivity among its students, faculty and staff. Through its curriculum, programs, policies, procedures, services and resources, Mason strives to maintain a quality environment for work, study and personal growth.

An emphasis upon diversity and inclusion throughout the campus community is essential to achieve these goals. Diversity is broadly defined to include such characteristics as, but not limited to, race, ethnicity, gender, religion, age, disability, and sexual orientation. Diversity also entails different viewpoints, philosophies, and perspectives. Attention to these aspects of diversity will help promote a culture of inclusion and belonging, and an environment where diverse opinions, backgrounds and practices have the opportunity to be voiced, heard and respected.

The reflection of Mason's commitment to diversity and inclusion goes beyond policies and procedures to focus on behavior at the individual, group and organizational level. The implementation of this commitment to diversity and inclusion is found in all settings, including individual work units and groups, student organizations and groups, and classroom settings; it is also found with the delivery of services and activities, including, but not limited to, curriculum, teaching, events, advising, research, service, and community outreach.

Acknowledging that the attainment of diversity and inclusion are dynamic and continuous processes, and that the larger societal setting has an evolving socio-cultural understanding of diversity and inclusion, Mason seeks to continuously improve its environment. To this end, the University promotes continuous monitoring and self-assessment regarding diversity. The aim is to incorporate diversity and inclusion within the philosophies and actions of the individual, group and organization, and to make improvements as needed.

Student Support Resources on Campus

Resources that you may find helpful may be found at:

<http://ctfe.gmu.edu/teaching/student-support-resources-on-campus/>