

Course Information Sheet

Course: BMGT 831 (Network Optimization)

Semester: Spring 2013

Instructor: Dr. Bruce L. Golden

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Course location: VMH 1411

Course time: Tuesday 7:00-9:40 pm

Office hours: Monday, 2-4 pm & by arrangement

Course Objective: This graduate level course applies combinatorial methods to practical problem solving. The emphasis is on discrete optimization from an operations research perspective. Techniques from linear and integer programming, graph theory, matching theory, and network flows are developed. Shortest path problems, location problems, minimal spanning tree problems, the traveling salesman problem, and vehicle routing problems will be discussed. Current research and practice in the network optimization literature will be the focus of attention whenever possible.

There are numerous and diverse real-world applications of network optimization. Upon completion of this course, each student should have an appreciation for the beauty and applicability of network optimization techniques. In addition, students should be well-positioned to begin pursuing dissertation research in this area.

- Tentative Outline:
- I. Introduction and Applications Overview
 - II. Trees
 - III. The Transportation Problem
 - IV. Core Allocations
 - V. Algorithms, Complexity, and Heuristics
 - VI. The Minimal Spanning Tree (MST) problem
 - VII. The Capacitated MST Problem
 - VIII. Clustering
 - IX. The Traveling Salesman Problem and Variants
 - X. Shortest Paths
 - XI. Analysis of Heuristics
 - XII. The Vehicle Routing Problem
 - XIII. Maximal Flows
 - XIV. Genetic Algorithms, Simulated Annealing, Tabu Search, and Related Topics

Homework: Eighty pages of problems in network optimization will be made available during the first week of class. Three to five homework problems will be assigned each week. Each assignment should take approx. two to three hours to complete. These will be graded.

Text: An extensive and comprehensive two-volume set of typed class notes with references will be available from the Van Munching Hall Copy Services (Room 1406), during the first week of class. In addition, handouts will be distributed electronically or in hard-copy form each week. Finally, we recommend the text Networks and Graphs by David K. Smith, Horwood Publishing, Limited (2003) as a secondary source.

Exams & Project: There will be two exams. These will be in-class, closed-book exams. A team project will be assigned by mid-semester and will culminate in a research paper and presentation. It should help prepare the student for thesis and dissertation research. One of the team projects will be selected as the winner of the Jeremiah Golden Prize. Each member of

this team will receive extra points which will be added to the homework grade.

Grades: Each exam will count for one quarter of the course grade. The team project will also be worth 25% of the course grade. Homework will account for the remaining quarter.

Key Dates:

March 5	Exam 1
March 17-24	Spring Break
April 9	Exam 2
May 7	Poster Presentation
May 7	Last class

Academic Integrity: The University's Code of Academic Integrity is designed to ensure that the principles of academic honesty and integrity are upheld. All students are expected to adhere to this Code. The Smith School does not tolerate academic dishonesty. All acts of academic dishonesty will be dealt with in accordance with the provisions of this code. Please visit the following website for more information on the University's Code of Academic Integrity:
<http://www.studenthonorcouncil.umd.edu/code.html>

On each exam or assignment you will be asked to write out and sign the following pledge. "I pledge on my honor that I have not given or received any unauthorized assistance on this exam/assignment."

Special Needs: Any student with special needs should bring this to the attention of the instructor as soon as possible, but not later than the second week of class.

About the Professor

Bruce Golden received his undergraduate degree in mathematics from the University of Pennsylvania and his masters and doctoral degrees from the Massachusetts Institute of Technology. He joined the faculty of the University of Maryland Business School in 1976 and served as a Department Chairman from 1980 to 1996. Currently, he is the France-Merrick Chair in Management Science in the Robert H. Smith School of Business at the University of Maryland. His research interests include heuristic search, combinatorial optimization, networks, and applied operations research. Bruce has received numerous awards, including the Thomas L. Saaty Prize (1994 and 2005), the University of Maryland Distinguished Scholar-Teacher Award (2000), the INFORMS Award for the Teaching of OR/MS Practice (2003), and the INFORMS Computing Society Prize (2005). He was named an INFORMS Fellow in 2004. In 2011, he received the Harvey J. Greenberg Award for lifetime contributions to the INFORMS

Computing Society. Since 1999, Bruce has served as Editor-in-Chief of *NETWORKS*. Before that, he was Editor-in-Chief of the *INFORMS Journal on Computing*.

In addition, he has received numerous contracts and grants, has consulted for a wide variety of organizations, and has served on the Board of Directors of several high-tech companies based in Maryland. In 1980, he founded a management consulting company with several colleagues. The focus was on business logistics. Clients included IBM, UPS, the U.S. Postal Service, the U.S. Air Force, the U.S. Army, Federal Express, Toyota, DuPont, and many others. In the late 1980's, Bruce co-founded a second company, specializing in the design and sales of vehicle routing software. He and his partners successfully grew these companies and sold them in late 1998. The surviving company is RouteSmart Technologies, Inc.