

Seminar in Stochastic and Dynamic Location and Layout

Goals:

The goals of this advanced seminar are:

- To introduce students to key concepts, models and algorithms in stochastic and dynamic location and facility layout problems
- To help students improve their ability to read technical literature in a critical manner
- To help students learn to present technical material on a variety of levels
- To introduce students to the refereeing process and to the role that it plays in technical writing and publishing.

Course requirements and grading:

The course will be centered around the reading and presentation of technical papers in the field of stochastic and dynamic location and layout. Students will be expected to attend class, to have read the relevant papers prior to each class, and to participate in all discussions.

Paper presentations:

Most papers will be presented by **students** in the class and not by one of the instructors. Each student presentation will be divided into two parts. In the first part, students will be expected to present an *overview* of the problem discussed in the paper(s). This should highlight what problem the paper(s) is (are) addressing, why the problem is important or of interest, and what the key results are. This part of the presentation should take approximately 20 minutes and should be given using Powerpoint slides as if you were giving an INFORMS conference presentation of the paper(s). In the second part of the presentation, you are to give an hour-long presentation of the paper in which you go over specific technical details of the paper(s) or present small numerical examples of algorithms introduced in the paper(s). This is where you can and should go into detail about the paper(s). *The goal of this component of the course is to enable you to present technical material at a variety of levels.*

Paper reading:

All students are to read each paper that will be discussed in class. Students will also be asked to prepare a 1-2 paragraph summary of each paper presented in class, indicating the problem the paper is dealing with, summarizing the key results, and putting the paper in the context of related literature if possible. This should be of the form that might be included in a somewhat detailed literature review. These are to be handed in at the beginning of each class in which a new set of papers is to be discussed (i.e., roughly

weekly). *The goal of this component of the course is to help you participate more fully in the presentation of the papers and to learn how to summarize technical material.*

Paper refereeing:

One or two times during the quarter you will be given a paper to referee. This will be given to you as if an editor had asked you to referee the paper. You are to prepare a referee report for the paper and a cover letter to the editor summarizing your recommendations for the paper's disposition. *The goal of this component of the course is to help you learn how to referee papers and to refine your ability to read critically and constructively.*

Instructors:

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Daskin

office hours: Tuesday, 2-4 **or any other time** by appointment. I am serious about the **any other time** part. I am not sure if Tuesday 2-4 will work for everyone, so please just send me an e-mail to set up an appointment if you need/want to see me!

TENTATIVE COURSE SCHEDULE

Week 1 – January 6-8, 2001
Course introduction and overview of location problems

Required Reading:

Current, J., Daskin, M. and D. Schilling, 2001, "Discrete Network Location Models," forthcoming as chapter 3 in Facility Location Theory: Applications and Methods, (Z. Drezner and H. Hamacher eds.)

ReVelle, C. and J. C. Williams, 2001, "Reserve Design and Facility Siting," chapter 10 in Facility Location: Applications and Theory, (Z. Drezner and H. W. Hamacher, eds.).

Recommended Additional Reading

Marianov, V. and D. Serra, 2001, "Location Problems in the Public Sector," chapter 4 in Facility Location: Applications and Theory, (Z. Drezner and H. W. Hamacher, eds.).

Week 2 – January 13-15, 2001
Expected covering problems

Required Reading

Ball, M. O. and F. L. Lin, 1993, "A Reliability Model Applied to Emergency Service Vehicle Location," *Operations Research*, **41**:1, 18-36.

Berman, O. and D. Krass, 2001, "Facility Location Problems with Stochastic Demands and Congestion," chapter 11 in Facility Location: Applications and Theory, (Z. Drezner and H. W. Hamacher, eds.).

Daskin, M. S., 1983, "A Maximum Expected Covering Location Model: Formulation, Properties and Heuristic Solution," *Transportation Science*, **17**, 48-70.

Week 3 – January 20-22, 2001
Location Scenario Planning

Required Reading

Owen, S. H. and M. S. Daskin, 1998, "Strategic facility location: A review," *European Journal of Operational Research*, **111**, 423-447.

Schilling, D. A., 1982, "Strategic Facility Planning: The Analysis of Options," *Decision Sciences*, **13**, 1-14.

Serra, D. and V. Marianov, 1998, "The p-median problem in a changing network: the case of Barcelona," *Location Science*, **6**, 383-394.

Week 4 – January 27-29, 2001
Scenario Planning Continued

Required Reading

Daskin, M. S., Hesse, S. M. and C. S. ReVelle, 1997, " α -Reliable P-Minimax Regret: A New Model for Strategic Facility Location Modeling," *Location Science*, **5:4**, 227-246.

Gutierrez, G. J., Kouvelis, P. and A. Kurawarwala, 1996, "A robustness approach to uncapacitated network design problems," *European Journal of Operational Research*, **94**, 362-376.

Week 5 – February 4-6, 2001
1 Median Stochastic Location Problems

Required Reading

Erkut, E. and B. C. Tansel, 1992, "On parametric medians of trees," *Transportation Science*, **26:2**, 149-156.

Averbakh, I. and O. Berman, 2000, "Minmax Regret Median Location on a Network Under Uncertainty," *INFORMS Journal on Computing*, **12:2**, 104-110.

Recommended Additional Reading

Vairaktarakis, G. L. and P. Kouvelis, 1999, "Incorporation Dynamic Aspects and Uncertainty in 1-Median Location Problems," *Naval Research Logistics*, **46**, 147-168.

Week 6 – February 11-13, 2001
Options and Layout

Required Reading

Lowe, T. J., Wendell, R. E. and G. Hu, 1999, "Screening location strategies to reduce exchange rate risk," working paper, University of Iowa, Iowa, IA.

Huchzermeier, A. and M A. Cohen, 1996, "Valuing operational flexibility under exchange rate risk," *Operations Research*, **44**:1, 100-113.

Gutierrez, G. J. and P. Kouvelis, 1995, "A robustness approach to international sourcing," *Annals of Operations Research*, **59**, 165-193.

Recommended Additional Reading

Hanink, D. M., 1984, "A portfolio theoretic approach to multiplant location analysis," *Geographical Analysis*, **16**:2, 149-161.

Kogut, B. and N Kulatilaka, 1994, "Operating Flexibility, Global Manufacturing, and the Option Value of a Multinational Network," *Management Science*, **40**:1, 123-139.

Week 7 – February 18-20, 2001
Dynamic Location Problems

Required Reading

Ballou, R. H., 1968, "Dynamic warehouse location analysis," *Journal of Marketing Research*, **V**, 271-276.

Jornsten, K. and M. Bjorndal, 1994, "Dynamic Location Under Uncertainty," *Studies in Regional and Urban Analysis*, **3**, 163-183.

Daskin, M.S., W.J. Hopp, and B. Medina, 1992, "Forecast Horizons and Dynamic Facility Location," *Annals of Operations Research*, **40**, pp. 125-151.

Week 8 – February 25-27, 2001
Facility Layout Overview

Required Reading

Benjafaar, S., Heragu, S. S. and S. A. Irani, 2001, "Next Generation Factory Layouts: Research Challenges and Recent Progress," submitted to *Interfaces*.

Meller, R. D. and K.-Y. Gau, 1996, "The Facility Layout Problem: Recent and Emerging Trends and Perspectives," *Journal of Manufacturing Systems*, **15**:5, 351-366.

Week 9 – March 4-6, 2001
Dynamic Layout Problems

Required Reading

Balakrishnan, J. and C. H. Cheng, 1998, "Dynamic Layout Algorithms: a State-of-the-art Survey," *Omega: International Journal of Management Science*, **26**:4, 507-521.

Balakrishnan, J. and C. H. Cheng, 2000, "Genetic search and the dynamic layout problem," *Computers and Operations Research*, **27**, 587-593.

Kaku, B. K. and J. B. Mazzola, 1997, "A Tabu-Search Heuristic for the Dynamic Plant Layout Problem," *INFORMS Journal on Computing*, **9**:4, 374-384.

Kochhar, J. S., Foster, B. T. and S. S. Heragu, 1998, "HOPE: A genetic algorithm for the unequal area facility layout problem," *Computers and Operations Research*, **25**:7/8, 583-594.

Kochhar, J. S. and S. S. Heragu, 1999, Facility layout design in a changing environment," *International Journal of Production Research*, **37**:11, 2429-2446.

Urban, T. L., 1993, "A heuristic for the dynamic facility layout problem," *IIE Transactions*, **25**:4, 57-63.

Urban, T. L., 1998, "Solution procedures for the dynamic facility layout problem," *Annals of Operations Research*, **76**, 323-342.

Week 10 – March 11-13, 2001
Robust Layout Problems

Required Reading

Rosenblatt, M. J. and H. L. Lee, 1987, "A robustness approach to facilities design," *International Journal of Production Research*, **25**:4, 479-486.

Kouvelis, P., Kurawarwala, A. A. and G. J. Gutierrez, 1992, "Algorithms for robust single and multiple period layout planning for manufacturing systems," *European Journal of Operational Research*, **63**, 287-303.

One additional area we will probably not cover: Stochastic Programming Location Problems:

Key References

Cheung, R. K.-M. and W. B. Powell, 1996, "Models and algorithms for distribution problems with uncertain demands," *Transportation Science*, **30**:1, 43-59.

Franca, P. M. and H. P. L. Luna, 1982, "Solving Stochastic Transportation-Location Problems by Generalized Benders Decomposition," *Transportation Science*, **16**:2, 113-126.

Hodder, J. E. and J. V. Jucker, 1985, "A simple plant-location model for quantity setting firms subject to price uncertainty," *European Journal of Operational Research*, **21**, 39-46.

Laporte, G., Louveaux, F. V. and L. Van Hamme, 1994, "Exact solution to a location problem with stochastic demands," *Transportation Science*, **28**:2, 95-103.

Louveaux, F. V., 1986, "Discrete Stochastic Location Models," *Annals of Operations Research*, **6**, 23-34.

Louveaux, F. V. and D. Peeters, 1992, "A Dual-Based Procedure for Stochastic Facility Location," *Operations Research*, **40**:3, 564-573.