OIDD 940

Gad Allon and Sergei Savin

Fall 2020

Time: Tuesdays, 3:00 PM – 6:00 PM EST

Mode of Delivery: Online, Live (Synchronous)

This is an introductory doctoral course on operations management. We will focus on many classical papers, as well as discuss major recent research streams, which occupied our field in the last 10-20 years. Methodologically, we will study mathematical models as well as empirical and experimental work which has been advancing recently.

The goals of this course are (1) get you acquainted with major research streams in Operations Management, (2) orient you in tradeoffs one faces in doing modeling vs. data-driven work, (3) stimulate your research ideas through paper discussions, and (4) prepare you for concisely explaining key results of the paper.

This course will be primarily based on discussions/presentations of research papers. A note after each paper in the syllabus indicates who will present it (us or student, or a guest speaker) and to what extent you need to read it: skim (meaning read introduction and conclusion, and skim through the results) or read rather carefully.

There will be several homeworks which are meant to serve as a practice for applying some basic concepts. Homeworks are due at the beginning of the session. You can discuss homeworks and work together on them but each student must make a separate submission. Moreover, each student will come up with a topic for a course paper which should relate to one of the topics that we discuss. The basic idea for the paper will be due mid-course, and last session will include presentations of the course papers.

There will be many readings and a few presentations per person per course. Final grade will be a combination of course paper and paper presentations/discussions.

Most materials are available electronically – please let us know if you are unable to find a particular paper.

Guidelines for paper discussants

The discussant for each paper should become an expert on that paper: the discussant should clearly understand the model, the solution methodology and the insights. Hence, we recommend that you study syllabus in advance and form preferences over topics you want to study in details. Furthermore, the discussant should be prepared to answer questions on how the paper compares with related literature, i.e., the discussant should skim the key references in the paper as well.

Presentations on each paper should be approximately 40 minutes in length. I suggest using approximately 15-20 slides (NOT copies of the paper pages). The presentation should cover at least the following items:

- What are the main objectives of the paper, i.e., what is the author (or authors) attempting to achieve with this paper?
- Briefly describe the model. The emphasis is on brief, since the assumption should be that everyone has read the paper.
- List the key assumptions. Which are the key assumptions, i.e., the ones that are needed for analytical tractability and/or ones that are needed to obtain the qualitative insights. (Do not list all assumptions, since that would be a poor use of time.)
- What are the novel features of the model? Are there features of the model that are novel, i.e., that have not been incorporated into other research?
- Briefly describe the solution methodology. What techniques/theorems are used to obtain the answers in the paper? If the solution methodology is novel and potentially useful in other applications, then this should be emphasized.
- What are the key insights from the paper? What are the key lessons that we learn from the paper? Which are surprising? Which contradict previous theories/models?
- What directions are there for future research? How should this paper lead to follow-up work?

It is clearly impossible to completely cover each of these points for each paper in 40 minutes. Hence, the discussant should emphasize the points which are most relevant.

Class Sessions (subject to change)

Class 1: Overview. Basic Inventory Models (Sergei) September 1

(no pre-readings for the first class)

1. Arrow, K.J., T. Harris, and J. Marshak. 1951. Optimal Inventory Policy, *Econometrica*. (Sergei)
2. Rudi, N. and S. Netessine. 2007. Lecture notes on inventory models. (Sergei)
3. Clark, A.J. and H. Scarf. 1960. Optimal Policies for a Multi-Echelon Inventory Problem. *Management Science*, 6(4): 475-490. (student)
4. Wagner, H.M., and T.M. Whitin. 1958. Dynamic Version of the Economic Lot Size Model. Management Science, 5(1): 89-96. (student)

Class 2: Information in Supply Chains (Sergei) September 8

1. Lee, H.L., V. Padmanabhan, and S. Whang. 1997. Information Distortion in a Supply Chain: The Bullwhip Effect. Management Science, 43(4): 546-558. (Sergei)
2. Cachon, G.P. and M. Fisher. 2000. Supply Chain Inventory Management and the Value of Shared Information. Management Science, 46(8): 1032-1048. (Sergei)
3. Aviv, Y. 2001. The effect of collaborative forecasting on supply chain performance. Management science, 47(10), 1326-1343. (student)
4. Li, L. 2002. Information sharing in a supply chain with horizontal competition. *Management Science*, *48*(9), 1196-1212. (student)

Class 3: Product Variety: Choice and Substitution (Sergei) September 15

1. van Ryzin, R. and S. Mahajan. 1999. On the Relationship Between Inventory Costs and Variety Benefits in Retail Assortments. *Management Science*, 45(11): 1496-1509. (Sergei)
2. Netessine, S. and N. Rudi. 2003. Centralized and Competitive Inventory Models with Demand Substitution. *Operations Research*, 51(2): 329-335. (Sergei)
3. Caro, F., and J. Gallien. 2007. Dynamic assortment with demand learning for seasonal consumer goods. *Management Science*, 53(2), 276-292. (Sergei)
4. Fisher, M.L., and R. Vaidyanathan. 2014. A Demand Estimation Procedure for Retail Assortment: Optimization with Results from Implementations. *Management Science*, 60(10), 2401-2415. (student)
5. Farias, V.F., S. Jagabathula, and D. Shah. A Non-Parametric Approach to Modeling Choice with Limited Data. 2013. *Management Science*, 59, no. 2: 305-322. (student)

Class 4: Supply Chain Contracting **September 22**

Guest Speaker: Serguei Netessine

1. Pasternack, B.A. 1985. Optimal Pricing and Return Policies for Perishable Commodities. Marketing Science, 4(2): 166-176. (Guest Speaker)
2. Lariviere, M.L., and E.L. Porteus. 2001. Selling to the Newsvendor: An Analysis of Price-Only Contracts. *Manufacturing & Service Operations Management*, 3(4): 293-305. (student)
3. Cachon, G.P., and M.A. Lariviere. 2005. Supply Chain Coordination with Revenue-Sharing Contracts: Strengths and Limitations. Management Science, 51(1): 30-44. (student)
4. Cachon, G.P. 2003. Supply Chain Coordination with Contracts. Chapter 6 in Handbooks in Operations Research and Management Science: Supply Chain Management (S. Graves and T. de Kok, eds.), North-Holland. (skim)
5. Kim S.-H., M.A. Cohen, and S. Netessine. 2007. Performance contracting in after sales supply chains. Management Science, Vol. 53, No. 12, 1843-1858. (Guest Speaker)

Class 5: Revenue Management (Sergei) **September 29**

1. Belobaba, P.P. 1989. Application of a Probabilistic Decision Model to Airline Seat Inventory Control. *Operations Research*, 37(2): 183-197. (Sergei)
2. Gallego, G., and G. van Ryzin. 1994. Optimal Dynamic Pricing of Inventories with Stochastic Demand over Finite Horizons. Management Science, 40(8): 999-1020. (Sergei)
3. Talluri, K., and G. van Ryzin. 2004. Revenue Management Under a General Discrete Choice Model of Consumer Behavior. Management Science, 50(1): 15-33. (student)
4. Netessine, S., and R.A. Shumsky. 2005. Revenue Management Games: Horizontal and Vertical Competition. Management Science, 51(5): 813-831. (student)

Class 6: Empirical Research in Retail Operations **October 6**

Guest Speaker: Santiago Gallino

Papers: TBA

Class 7: Structural Model Estimation in OM **October 13**

Guest Speaker: Ken Moon

Papers: TBA

Class 8: Manufacturing Strategies (Gad) **October 20**

1. Fine, C.H., and R.M. Freund. 1990. Optimal Investment in Product-Flexible Manufacturing Capacity. *Management Science*, 36(4): 449-466. (student)
2. Jordan, W.C., and S.C. Graves. 1995. Principles on the Benefits of Manufacturing Process Flexibility. *Management Science*, 41(4): 577-594. (student)
3. Van Mieghem, J. A. 1998. Investment strategies for flexible resources. Management Science, 44(8): 1071-1078. (student)
4. Goyal M., and S. Netessine. 2007. Strategic technology choice and capacity investment under demand uncertainty. *Management Science*, 53(2): 192-207. (Gad)
5. Choudhary, V., S. Hasija, and S. Netessine. 2018. Do Flexibility and Chaining Really Help? An Empirical Analysis of Automotive Plant Networks. INSEAD Working Paper No. 2018/58/TOM, Available at SSRN: https://ssrn.com/abstract=3301302 or http://dx.doi.org/10.2139/ssrn.3301302 (Gad)

Class 9: Queueing Models (Gad) **October 27**

1. Naor, P. 1969. The Regulation of Queue Size by Levying Tolls. Econometrica, 37(1): 15-24. (skim)
2. Mendelson, H. and S. Whang. 1990. Optimal Incentive-Compatible Priority Pricing for the M/M/1 Queue. *Operations Research*, 38(5): 870-883. (student)
3. Gans, N., G. Koole, and A. Mandelbaum. 2003. Telephone Call Centers: Tutorial, Review, and Research Prospects. *Manufacturing & Service Operations Management*, 5(2): 79-141. (skim)
4. Cachon, G.P., and P. Harker. 2002. Competition and Outsourcing with Scale Economies. *Management Science*. Vol. 48, No. 10. (student)
5. Larson, R.C. 1987. Perspectives on Queues: Social Justice and the Psychology of Queueing. Operations Research, 35(6): 895-905. (Gad)
6. Rothkopf, M.H., and P. Rech. 1987. Perspectives on Queues: Combining Queues Is Not Always Beneficial. Operations Research, 35(6): 906-909. (Gad)

Class 10: Empirical Service Operations (Gad) **November 3**

Papers: TBA

Class 11: Interface of Finance and Operations Management **November 10**

Guest Speaker: Simone Marinesi

Papers: TBA

(* Proposals for the course paper topics (1-2 paragraphs) are due on November 10. ***)**

Class 12: Empirical Research in Healthcare Operations **November 17**

Guest Speaker: Hummy Song

Papers: TBA

Class 13: Behavioral Operations Management **November 24**

Guest Speaker: Xuanming Su

Papers: TBA

Class 14: Paper Presentations **December 1**

Presentation session will be jointly hosted by Gad and Sergei.

(* Final papers (around 10 pages) are due on December 12. ***)**