Goal: The course covers probabilistic and recursive economic models and their applications in price theory, distribution channel management, supply chain management and risk analysis. The managerial focus is on place (distribution), price and promotion of the 4Ps under both operational and marketing environments. The course introduces essential demand and supply theories and analytical modeling techniques to doctoral students, bring them to the research frontier on the SC-marketing interfaces and grant them ability to publish on both operations management and marketing journals.

Prerequisite: Basic optimization techniques, elementary probability theory and introductory microeconomics.

Related Courses: 26:799:675 Marketing Models; 26:799:685 Supply Chain Inventory Models

Textbook: None. The course is based on lecture notes and academic journal papers.

Class Participation: Class participation is necessary. Students are required to discuss lecture materials in class.

Homework: Exercise problems will be given throughout the semester. Even though students do not need to hand in their work, they are encouraged to try the problems first and then discuss solutions in-class.

Presentation: Each team (with at most 2 students) is required to give two presentations based on journal papers.

Exam: One in-class final exam on Dec 4. Exam questions are related to class materials and exercise problems. Understanding lecture notes and papers and solving the exercise problems are essential for passing the course.

Grades: 20% class participation, 30% team presentation and 50% final exam.
**Presentation**

Depending on enrollment, each team (with at most 2 students) will select two journal papers and give a formal lecture based on each paper. In the lecture, you need to explain the research problem, the motivation, the model, and the solution to the problem. You also need to compare the paper to existing work and point out the contribution. Feel free to take you time to clearly explain the paper.

Besides the presenters, the rest of the class will serve as discussants. The main task of a discussant is to provide a critique of the paper presented: the significance of the problem, the suitability of the model, the limitations of modeling assumptions, the role that these assumptions play in obtaining results, and possible extensions. In addition, discussants should look for common themes or key issues that link related papers and enhance our understanding of the topic. Lastly, discussants are expected to raise challenging questions that would guide class discussion.

The presentation will be graded based on how well you motivate the research and how clearly you explain the model and results.
Topics covered (tentative)

Recommended textbooks:


PART I. PROBABILITY MODELS AND APPLICATIONS

0. Modeling Principles and History of Probability Studies (1 week)

- Chapters 1-8 of BM

1. Probability theory and applications in decision and risk analysis (4 weeks)

- Chapter 1 of SP
- Uncertainty and decision making (utility theory, risk aversion, prudence)
- Applications in asset pricing theory (stochastic discount factors, B-S option pricing formula, mean-variance analysis)

2. Demand theory and profit maximization from a failure rate perspective (1 week)

- Chapter 9 of SP
- Chapters 9-10 of BM
3. Pricing, double marginalization and externality in a manufacturer-retailer distribution channel/ supply chain (2 week)


4. Promotion, pass-through rates and revisit of failure rates (1 week)

5. Strategic pricing leadership and game formats in distribution channels (1 week)


PART II. RECURSIVE ECONOMIC MODELS AND APPLICATIONS

6. Poisson Processes, Markov chains and control theory (1 week)

- Chapters 2 and 4 of SP

7. Purchasing Incidence Models (1 week)

- Chapter 12 of BM

8. Dynamic Pricing with fixed capacity/inventory (1 week)


9. Final Exam (1 week)