Instructor: Dr. Yao Zhao  
Email: yaozhao@andromeda.rutgers.edu  
Office: Ackerson Hall 300i  
Tel: 973-353-5017  
Office Hours: by appointment

Course Objectives: The goal of this course is two fold: (1) help students to build a solid understanding of the models, methodologies and solution approaches in supply chain inventory management; (2) bring students to the research frontier of supply chain inventory management. The course is targeted at graduate (M.S. or Ph.D.) students in the areas of operations management, operations research, industrial engineering and management science. To prepare students to do research and to train students for the job market, this course combines lectures, literature reading and presentations.

Topics covered (tentative)
- Multi-echelon inventory models
- Assemble-to-Order system, allocation rules and component commonality
- Risk aversion and supply chain management
- Revenue management – joint pricing and inventory decisions
- Supply chain dynamics – the bullwhip effect
- Supply chain incentive issues and contract – coordination and competition
- Procurement, outsourcing & supply management

Prerequisite: familiarity with linear/non-linear optimization, probability and stochastic processes is essential. It is recommended that students are familiar with basic concepts of stochastic dynamic programming.


Other Books:

Every student should present a research paper of his/her own, and two other students will serve as referees
Course Policy

Course Requirement: Class grade is based on the following components with the stated weights:

- Problem sets 40%
- Presentation & Discussant 30%
- Term paper 30%

Class Participation: Class participation is necessary. If you cannot attend a class, please notify me in advance with a good reason and a solid proof, such as interviews and illness. Absence from the class twice without a good reason could directly result in failure in this course.

Active Learning: To prepare you for a successful career in either academic or industry, this course is planned so that you can get involved in research activities. You will prepare and make presentation, serve as a discussant, search and review literature, and most importantly, identify research problems.

Presentations: depending on enrollment, each student will select several papers (listed below) and present these papers as if you are the author. You can also pick paper of your interest outside of the list, but with my permission. In the presentation, you need to explain the research problem, the motivation, the models, and the solution to the problem. You also need to compare to existing results and point out the contribution. The time limit for a presentation is 1 hour (including Q&A, prepare it as if it is your job talk!).

The presentations will be graded based on how well you motivate the research, how clear is the model and results.

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

The discussants will prepare referee reports to the paper presented.

Referee Reports: Papers submitted to refereed journal typically goes through a peer-review process, during which an associated editor (AE) assigns the paper to (at least) two referees. The referees will read the paper and provide suggestions to AE on either accepting or revising or rejecting the paper. A good referee provides constructive suggestions that allow the author to improve the paper. When you serve as a referee, remember one thing: **it is too easy to criticize a paper**; ask yourself two questions: what can I learn from this paper? How can I help the author improve the paper?
Term Paper: The term paper is due on the last day of class. It should be at most 12 typed pages without reference (12pt Times, Times New Roman, 1 inch margins on all sides, double-spaced). You have two options for the term paper:

1. **Research Proposal.** In your proposal you should
   a. Identify an open research question: either an interesting real world phenomenon or a gap in the existing literature.
   b. Provide a literature review that makes clear the importance of the topic and how relevant papers fail to address the questions or do not provide a satisfactory answer.
   c. Outline a suitable model to address the question and sketch the analysis one would want to carry out.

   Think of your document as a proposal you are submitting to a funding agency (e.g., NSF), which relies on a peer-review process to allocate funds. You can expect that your reviewers are familiar with the general research area (Supply Chain Management), but are not experts in your particular subfield. You can also count on the reviewers to be very bright, but extremely busy academic or industry professionals. Your goal is to convince them that your research will address a very important and very timely problem (sections on the problem statement, problem motivation, literature review will serve to accomplish that), and that, if the agency gives you money, you are likely to succeed (sections on the model and the outline of the analysis should help them to make that decision).

   The research proposal will be graded based on how convincing it is.

2. **Original Research.** Under this option, you should identify an open research question: either an interesting real world phenomenon or a gap in the existing literature; and attempt to answer it. The objective is to obtain original results that add to the existing knowledge. Similar to the Research Proposal, your report for this alternative should make it clear what research problem you are solving and why this problem is important. But your report should particularly emphasize the results you obtained. You are encouraged to discuss with me on anything you are interested.

   For an academician, there is nothing more challenging and rewarding than publish in top journals and make an impact. Therefore, I do not expect that you will have a complete answer to a problem (especially, a difficult problem). Your work will be graded based both on the importance of the problem and the significance of the results.

**Homework:** Homework problems will be assigned for some well established results.
Weekly Schedule

1. Introduction to Supply Chain Inventory Management (the Literature Tree, Basic Models, Publishable Work, Publish Strategy)
   - P. Zipkin 2000, “Introduction” & Chapters 1, 2, 3.

2. Review of Single-Stage Inventory Models – Dynamic and Stochastic Models
   - P. Zipkin (2000). Chapters 4, 9 (mention optimality results, focus on performance evaluation/optimization)


4. Stochastic ME Models: Assembly Systems

5. Assemble-to-Order Systems, Allocation Rules & Component Commonality


7. Risk Aversion and Supply Chain Management


8. Revenue Management – Joint Pricing and Inventory Decisions


9. Supply Chain Dynamics – the Bullwhip Effect


10. Supply Chain Contracts and Coordination I

11. Supply Chain Contracts and Coordination II


12. Supply Chain Incentive Issues: Competition


13. Decentralized Supply Chains: Information Asymmetry


14. Procurement, Outsourcing and Supply Management


15. Term Project Presentations