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IND E 570 Supply Chain Systems Spring 2021 (SLN15439 3 Credits)

Course Description: This PhD and advanced master level course covers classic and modern topics in supply and demand analytics. Tentative topics include deterministic and stochastic inventory theory, network planning and vehicle routing, revenue management (capacity control and dynamic pricing), demand (choice) modeling, and market design. The course provides a rigorous treatment of the mathematical foundations underlying these topics. It will draw a broad range of mathematical and analytical techniques such as dynamic programming based proofs, optimization theory and algorithms and mechanism design.

Instructor: Professor Chiwei Yan

Office: REMOTE

Email: chiwei@uw.edu

Office hours: TBD

Course Meetings: TTh 2:30pm-3:50pm, REMOTE

Course Materials: To help you and other students digest course materials, you will be assigned to take scribe notes. Your job will be to type up lecture notes in LaTeX to be shared with the rest of the class. Some of the course materials are drawn from the following textbooks:

1. Simchi-Levi, D., Bramel, Julien & Chen, Xin, 2014. *The logic of logistics: theory, algorithms, and applications for logistics and supply chain management* Third., New York: Springer. [[E-book](#) accessible from UW Libraries]
2. Snyder, L.V. & Shen, Zuo-Jun Max, 2019. *Fundamentals of supply chain theory* Second., Hoboken, New Jersey: John Wiley & Sons, Inc. [[E-book](#) accessible from UW Libraries]
3. Gallego, Guillermo & Topaloglu, Huseyin, 2019. *Revenue Management and Pricing Analytics*, New York, NY: Springer.

Other related textbooks include:

1. Talluri, K.T. & Van Ryzin, Garrett, 2004. *The theory and practice of revenue management*, Boston, Mass.: Kluwer Academic Publishers.
2. Toth, P. & Vigo, Daniele, 2002. *The vehicle routing problem*, Philadelphia: Society for Industrial and Applied Mathematics.

Prerequisite: IND E 508 and IND E 513, or other similar graduate-level classes in stochastic models and optimization, or permission of instructor. Background in optimization, dynamic programming and game theory would be very helpful, but by and large the course will be self-contained.

Grading: Grades will be based on homework assignments, scribe, and a project.

Preliminary Schedule:

Week 1, Deterministic Inventory Models

Week 2, Deterministic Inventory Models + Stochastic Inventory Models

Week 3, Stochastic Inventory Models

Week 4, Network Planning and Vehicle Routing

Week 5, Single-leg Revenue Management

Week 6, Network Revenue Management

Week 7, (Approximate) Dynamic Programming and Dynamic Pricing

Week 8, Choice Models

Week 9, Auctions and Mechanism Design

Week 10, Project Presentations