IEOR 150
Production Systems Analysis
Fall, 2015
TuTh 930-11 126 Barrows Hall

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Introduction

Course 150 is an introduction to Industrial Engineering methods for production planning, scheduling and control. Topics include quantitative models for operational and tactical decision-making in production systems, including production planning, inventory control, forecasting, and operations scheduling.

There will be one midterm examination and one final examination. There will be approximately 10 homework assignments. Homework does not count towards the course grade. However, examination questions will be similar to homework questions, so that mastery of homework questions is a strong predictor of good examination performance. The course grade is computed according to a maximization function involving weighted averages of letter grades assigned to midterm and final examinations, as follows:

$$G = \text{Max} \{ F, 0.33M + 0.67F \}$$

where G denotes the course grade, F denotes the final exam grade and M denotes the midterm exam grade. Note that an A grade on the final exam means an A grade in the course. Moreover, a good midterm examination grade can help to offset a weak final exam grade.

Required text: *Production and Operations Analysis* by Stephen Nahmias, 7th Edition. Additional course notes and lecture presentation slides may be down-loaded from bCourses.

Lecture outline (copies of presentation slides used in course lectures will be made available on the course bCourses site)

IEOR 150 Syllabus

Operations Strategy (Chapter 1) (0.5 weeks)

Dimensions of competition
Factory focus
Evaluation
Strategy Erosion
BPR
JIT
Time-Based Competition
Quality Competition
Product Life Cycles

Forecasting (Chapter 2) (1.5 weeks)

Causal models (econometrics)
Time series models
Measuring forecast errors
Simple moving average and exponential smoothing
Regression
Double exponential smoothing (Holt's Method)
Seasonality factors
Winters' Method for Seasonality
Relationship to Inventory Control

Inventory Control – Deterministic Demand (Chapter 4) (2 weeks)

Preliminaries
EOQ model
EMQ model
Quantity discounts
Budget constraints
Rotation cycles

Inventory Control – Uncertain Demand (Chapter 5) (2 weeks)

Preliminaries
Newsboy model
Reorder points with continuous review
Service levels
Variable lead times
Periodic review systems

Aggregate Planning (Chapter 3) (1 week)

Linear programming formulations

Midterm Examination (1 week)

Push and Pull Production Control Systems: MRP and JIT (Chapter 7) (2.5 weeks)

MRP
Incorporation of lot sizing into MRP
Capacitated lot sizing
JIT
Sophisticated Production Planning (Notes)

Operations Scheduling (Chapter 8) (2.5 weeks)

Sequencing rules in job shop scheduling
Stochastic scheduling
Assembly line balancing
Sophisticated Operations Scheduling (Notes)

Project Scheduling (Chapter 9) (1 week)

CPM calculus
Time-cost trade-off models
Managing uncertainty with PERT
Resource-constrained project scheduling

Review (1 week)