

# MFE654 Production Systems Design and Control

## Fall 2009

### Instructor:

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**Course webpage:** <http://blackboard.syr.edu>

**Class Hour:** Mondays 6 PM – 8:40 PM

**Class Space:** a cordial region in 105 Link Hall

**Prerequisite:** ECS526 or equivalent

### Course Materials:

1. "Production and Operations Analysis," Steven Nahmias, the **6th** edition, Irwin/McGraw-Hill, 2009.  
(A copy is on reserve at the Science and Technology Library)
2. Harvard Business School Cases  
(<http://www.hbsp.harvard.edu>)
  - i. L.L. Bean (HBS, 9-893-003)
  - ii. Sport Obermeyer (HBS, 9-695-022)
  - iii. Toshiba: Ome Works (HBS, 9-696-059)
  - iv. Toyota Motor Manufacturing (HBS, 9-693-019)
  - v. Barnes & Noble vs. Amazon.com (HBS, 9-798-063)
  - vi. Barilla SpA (A) (HBS, 9-694-046)

## Course Description

Introduction to the design and control of production systems using mathematical, computational and other modern techniques. Topics to be investigated will include forecasting, inventory systems, aggregate production planning, material requirements planning, project planning, job sequencing, operations scheduling, and reliability.

## Course Outline

- Introduction
- Demand Analysis
- Inventory Control
  - subject to known demand
  - subject to unknown demand
- Project Scheduling
- Operations Scheduling
- Materials Requirements Planning (MRP) / MRP II
- Enterprise Resource Planning (ERP) Systems
- Lean Enterprises/Just-In-Time Enterprise
- Supply Chain Management
- Other Current Issues

## Course Information

- Active class participation is encouraged and expected. However, students may be cold called as well.
- I grade class participation each day after class based on the extent to which comments reflect willingness to participate, preparation, analysis, listening and thoughtfulness.
- There will be weekly assignments, due at 6pm on the next session. One problem will be selected and graded. The final grade for each assignment will be the combination of the graded score and the number of problems completely solved.
- There will be two examinations during the semester, and they are important part of the learning process. The tests will be closed-book exam, however, students may bring an 8 ½" by 11" information sheet (front & back).

## Grading Policy

1.Participation (e.g. cases)	15 %
2.Assignments	20 %
3.Mid-Term Exam	30 %
4.Final Exam	35 %

**8/31/09 - Session #1**

- Introduction
- Forecasting
- Chapter 2
  - Characteristics of forecasting
  - Causal models
  - Time series methods
  - Methods for stationary series
  - Trend-based methods
  - Methods for seasonal series

**9/7/09**

- Labor Day (no class)

**9/14/09 - Session #2**

- Inventory Control subject to Known Demand
- Chapter 4
  - Characteristics of Inventory Systems
  - Relevant Costs
  - EOQ (Economic Order Quantity) Model
  - EOQ extensions
  - Quantity discount models
    - All-units discount
    - Incremental quantity discount
    - Car-load discount

**9/21/09**

- Eid Ul-Fitr (no class)

**9/28/09**

- Yom Kippur (no class)

**10/5/09 - Session #3**

- Inventory Control subject to Unknown Demand
- Chapter 5
  - Nature of randomness
  - Optimization criterion
  - The Newsboy model
  - Reorder point model
  - (Q,R) model

10/12/09 - Session #4

•Case Discussion

- L.L. Bean (HBS, 9-893-003)

Preparation Questions:

1. How does L.L. Bean use past demand data and a forecast to decide how many units of that item to stock?
2. How would you address Mark Fasold's concern that the number of items purchased usually exceeds the forecast?
3. What should L.L. Bean do to improve its forecasting process?

•Operations Scheduling

•Chapter 8

- Job shop scheduling
- Dispatching rules

10/19/09

- Mid-term Examination

## 10/26/09 - Session #5

- Case Discussion

- Sport Obermeyer (HBS, 9-695-022)

Preparation Questions:

1. Using the sample data given in Exhibit 10, make a recommendation for how many units of each style Wally Obermeyer should order during the initial phase of production. (Show your work/calculations.)  
Make necessary assumptions.
2. What operational changes would you recommend to Wally to improve performance?
3. How should Obermeyer management decide (both short-term and long-term) about outsourcing in Hong Kong versus China?

- Operations Scheduling

- Chapter 8

- Sequencing algorithms
- Assembly line balancing

## 11/2/09 - Session #6

- Case Discussion

- Toshiba: Ome Works (HBS, 9-696-059)

Preparation Questions:

1. What are the key elements of Toshiba's business strategy in notebook computers? In what way do Ome's operations support this strategy?
2. What would be good measures for evaluating the performance of Toshiba's Ome operations?
3. Assuming the assembly line prototype is implemented as shown in Exhibit 1, calculate the following quantities:
  - (a) Process capacity
  - (b) The maximum number of computers that can be produced in a 7.5 hour shift.
  - (d) Inventory on the assembly line.
  - (e) Flow time for a notebook computer.

- Project Scheduling

- Chapter 9

- CPM (Critical Path Method)



**11/9/09 - Session #7**

- Project Scheduling
- Chapter 9

–PERT (Project Evaluation and Review Technique)

–Resource considerations

**11/16/09 – Session #8**

- MRP
- Chapter 7

–MRP logic

–Bill of Materials (BOM)

–Types of BOM

–Lot-sizing

–Shortcomings of MRP

## 11/23/09 - Session #9

- Case Discussion

- Toyota Motor Manufacturing (HBS, 9-693-019)

Preparation Questions:

1. As Doug Friesen, what would you do to address the seat problem? Where would you focus your attention and solution efforts?
2. Where does the current routine for handling defective seats deviate from the principles of the Toyota Production System?
3. What is the real problem facing Doug Friesen?

- Lean Enterprise
- Chapter 7

## 11/30/09 - Session #10

- Case Discussion

- Barnes & Noble vs. Amazon.com (HBS, 9-798-063)

Preparation Questions:

1. Based on your own experience, compare willingness-to-pay for books supplied by these two business models.
2. Compare the forecast long-run cost position of a successful online bookseller to Barnes and Noble's traditional business model. (Refer exhibits 4 and 7).
3. Assess Barnes & Noble's response to the substitution threat from Amazon. How did Amazon respond in turn, and to what net effect?

- Supply Chain Management
- Chapter 6

- The transportation problem
- Determination of delivery routes
- Role of information in the supply chain

## 12/7/09 - Session #11

- Supply Chain Management
- Chapter 6
  - Designing products for supply chain
  - The Bullwhip effect
  - Postponement

- Case Discussion

- Barilla SpA (A) (HBS, 9-694-046)

### Preparation Questions:

1. Is there any evidence that Barilla faces the bullwhip effect? If so, what causes of the bullwhip effect are present?
2. Who resisted JITD and why? How would you respond to their concerns (i.e. how would you modify the JITD proposal to make it more acceptable?)
3. As one of Barilla's customers, what would your response to JITD be? Why?

## 12/14/09

- Final Examination