

ISE 4810/IHE 6810 – Production and Service Systems

Course Description

Explores industrial engineering concepts and quantitative techniques as it applies to manufacturing planning and control systems. Discusses production and service industries as well as supply chain systems.

Undergraduate/Graduate level – 3 credit hours

All tests include extra questions/problems that are required of Graduate Students, but that may be offered for extra credit to Undergraduate Students.

Graduate students are required to complete projects individually and will not be assigned to a group.

Offered both face-to-face and online

Course Learning Objectives

Students will learn the essential decisions, systems, and models of production planning and control including:

1. Understanding the hierarchy of production planning and control decisions from long term planning to real-time batch control.
2. Ability to select and use an appropriate inventory control model and policy, including EOQ, base stock, newsvendor and dynamic lot sizing.
3. Understanding of MRP system logic and ability to carry out bill of material explosion, lot sizing and planned order releases.
4. Ability to analyze performance of a production plan using costs and time as measures of performance.
5. Understanding of the sources of variability in production systems, and the relationship between variability and system performance.
6. Understanding of system performance measures such as utilization, cycle time, WIP and throughput.
7. Understanding of forecasting techniques including ability to apply moving average and exponential smoothing to a time series.
8. Knowledge of basic scheduling rules and their properties.
9. Evaluate system performance using queuing models and Little's Law.
10. Understanding of aggregate planning models including ability to formulate objective functions, resource constraints and inventory balances.

Course Learning Outcomes

After successful completion of the course, students will be able to convey the essential decisions, systems, and models of production planning and control including:

1. Understanding the hierarchy of production planning and control decisions from long term planning to real-time batch control.
2. Ability to select and use an appropriate inventory control model and policy, including EOQ, base stock, newsvendor and dynamic lot sizing.
3. Understanding of MRP system logic and ability to carry out bill of material explosion, lot sizing and planned order releases.
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Tentative Weekly Schedule

Week(s)/Topics

1. Introduction Inventory Systems: EOQ/EMQ Model
- 2, 3. Inventory Systems: Dynamic Lot Sizing, Inventory Systems:Newsvendor Model Inventory Systems: Base Stock and (Q,r) Systems
- 3, 4. Forecasting
- 5, 6. Planning Systems: Materials Requirement Planning, MRP II, ERP
Planning Systems: JIT
7. Test 1
- 7,8. Variability: Little's Law, Worst Case/Best Case Performance
Variability: Basic Queueing Models
9. Variability: Downtimes & Setups
Variability: Process & Move Batching
10. Scheduling
11. Aggregate planning
12. Test 2
- 12-15. Groups work on the Group Project
15. Group Project Due