ME 3222 – Production Engineering

Credits and Contact Hours: 3 Credits. Three 50 minute or two 75 minute lectures per week.

Instructors: Mark Makwinski, Bi Zhang


Specific Course Information:
- Catalog Description: Introduction to the modern techniques of Production Systems including the Decision-Making Process, Economic Analysis, Demand Forecasting, Production and Process Design and Optimization, Production Scheduling, and Statistical Quality Control.

- Prerequisites: Consent of instructor. Not open to students that have passed ME 5441.

- Required, Elective or Selected Elective: Elective

Specific Goals:
- Course Outcomes:
  After completing ME 3222 students should be able to:
  1. Understand how production engineering decisions fit into the overall strategic framework and management of an organization.
  2. Use their familiarity with a variety of operations management tools to be able to select the appropriate tool(s) to improve operational performance. [e.g. production scheduling, facilities location and layout, process selection, etc.]
  3. Appreciate the critical role that inventory plays throughout a modern supply chain, including its effects on costs and service quality.
  4. Predict future demand from historical data by the utilization of basic forecasting techniques.
  5. Identify key elements of the complex global nature of today's supply chains and the importance of technology and communications in optimizing their performance.
  6. Articulate the advantages and limitations of Lean Manufacturing and how adopting a lean approach can affect both a company's performance and its demands on its systems.
  7. Work in teams to utilize simple simulations of operational systems to experimentally evaluate the effects of proposed changes to their structure.

- Relationship of Course Outcomes to Criterion 3 Student Outcomes:
  a) an ability to apply knowledge of mathematics, science, and engineering:
     Students use computer-based tools to assist in production engineering decisions. In-class examples and independent homework develop student proficiency.
  b) an ability to design and conduct experiments, as well as analyze and interpret data:
     An in-class experimental exercise simulates the operation of a supply chain with students making the relevant production engineering decisions and experiencing
the effects on performance of the system. Students will optimize these models and utilize them to evaluate the relative value of proposed alternative procedures.

c) an ability to design a system, component, or process to meet desired needs: Students will evaluate, through assignments, in-class discussions, and group project work, how common industry processes make production engineering decisions, by assessing the effects these decisions have on operational objectives.

d) an ability to function on multi-disciplinary teams: Working in teams, the students design and test modifications to the baseline experimental exercise in an attempt to better address scheduling and inventory control performance in response to (customer) demand. Although the make-up of the teams may not be multidisciplinary, successful accomplishment of the objectives required understanding of the interactions between multiple organizational functions.

e) an ability to identify, formulate, and solve engineering problems: Exercises in evaluating the efficacy of common industry standard processes give students the ability to identify and solve problems in engineering.

f) an understanding of professional and ethical responsibility: not applicable.

g) an ability to communicate effectively: Students’ ability to effectively communicate will be enhanced principally through in-class discussions and their participation in formal presentations.

h) the broad education necessary to understand the impact of engineering solutions in a global and societal context: The topics discussed greatly impact the economic cost to society of quality merchandise.

i) a recognition of the need for, and an ability to engage in life-long learning: Students are exposed to the rapid changes in production engineering, driven by evolving concepts, which emphasizes the need for continuous learning.

j) a knowledge of contemporary issues: not applicable

k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice: Students gain the ability to use modern engineering tools (such as linear programming) in the solution of manufacturing operations problems.

Topics Covered:

- Introduction to Operations
- Competitiveness & Strategy
- Supply Chain Management
- Forecasting
- Systems Dynamics
- Inventory Management
- Processes, Technology, & Capacity
- Aggregate Planning
- Scheduling
- Waiting Line Analysis
- Facilities / Facility Location Models
- Just-In-Time and Lean Production
- Products & Services - QFD