Draft of Course Description

Course Title: Manufacturing Systems

Catalog Number: BUS-1550

Revision: August 2, 2012

Textbooks: Manufacturing Systems – An introduction to the technologies; 2nd edition by D. J. Williams

Manufacturing Systems, 2nd edition by R. Thomas Wright

Prerequisites: None

Length of Course: 15 Weeks

Essential Objectives: This course provides an overview of manufacturing systems and processes. Students will be exposed to a variety of manufacturing concepts including controlling production, resource planning, value chain management and professional roles in manufacturing. Students will explore career paths in the manufacturing environment and discuss the impact of manufacturing on Vermont, national and global economies and the environment.

Course Content:

1. Examine the changing roles of manufacturing on local, regional, national or global economies.
2. Explore and compare roles and professions commonly found in manufacturing and describe common certifications and credentials required for each.
3. Understand, describe, and explain the roles of planning and organizing in a manufacturing system.
4. Describe and explain key components of the entire value chain including supplier relationships, manufacturing cost control, and internal and external customer relationships.

5. Evaluate the effective use of standard manufacturing management tools including Lean techniques, Continuous Process Improvement (CPI), Just in Time, Enterprise Resource Planning (ERP), and Materials Resource Planning (MRP).
6. Analyze sustainable and green manufacturing practices from an environmental and economic standpoint.
7. Demonstrate proficiency in understanding, interpreting, evaluating and applying quantitative data, charts, graphs and diagrams commonly used in the manufacturing environment.

Methods

- Lectures and demonstrations
- Research assignments/homework
- Field trip to a manufacturing facility and concluding analysis report
- Quizzes
- Student presentations and reports
- Final group project – Develop a simple product and a corresponding manufacturing system. Project status reports will be submitted on a regular basis.

Evaluation Criteria

- Group project 30%
- Quizzes 20%
- Research assignments/homework 20%
- Attendance and participation 20%
- Field trip analysis report 10%

Grading Criteriae

A+	97 – 100
A	94 – 96
A-	90 – 93
B+	87 – 89
B	84 – 86
B-	80 – 83
C+	77 – 79
C	74 – 76
C-	70 – 73
D+	67 – 69
D	64 – 66
D-	60 – 63
F	59 – below

Week	Topic	Assignment
1	Introduction and course overview • Rationale of manufacturing • Universal systems model • Business drives for manufacturing • Manufacturing systems approaches such as top down or bottom up	Required Reading • Chapter 1 of MSIT (pg. 4-12) Activity • Watch Universal Systems Model video Homework • Choose a simple product/goal and develop a process based on the information contained in the video
2	Approaches to Factory Layouts • Traditional factory layouts • Group technology • Dedicated automation strategies • Just-in-time and continuous improvement philosophies	Required Reading • Chapter 2 of MSIT (pg. 13-30) Activity • Use the Web and research the pros and cons of the just-in-time system Homework • Prepare a written report or presentation based on the results of your research.
3	Manufacturing in Vermont • Types of manufacturers – from cheese to aerospace • Effects of manufacturing on the Vermont economy, environment, employment and education.	Required Reading • No textbook reading required this week Activity • Access the Websites of three Vermont manufacturers • Determine what they produce • What type of skillsets do they bring to Vermont Homework • Prepare a written report or presentation based on the results of your research including possible effects on the economy, environment, employment and education.
4	Manufacturing Cells • Definition and purpose of a manufacturing cells • Advantages and disadvantages of cellular approaches • Prismatic and revolute machining cells and their key differences • Robot processing cells	Required Reading • Chapter 7 of MSIT (pg. 108-129) 1st Quiz • Quiz will be based on the material covered during the first three weeks. Homework • Sketch a simple manufacturing cell that will place 12 bags of coffee in a carton, close and label the carton and then place it on a pallet for shipping.
5	Manufacturing Field Trip • Describe background of company and type of production • Describe required personnel, i.e. engineering, maintenance, purchasing etc. • Determine type of education/credentials for these positions.	Required Reading • Chapter 9 of MSIT (pg. 151-172) Homework Prepare a written report or presentation describing the results of your field trip
6	Organization and Planning-Part 1 • Company organization and structure • Types of management structures • Levels of authority and responsibility	Required Reading • Chapter 14 of MS (pg. 185-194) Activity • Develop an organizational chart of the organization that you work for.
7	Organization and Planning Part 2 • Managed product centered activities • Managed support activities	Required Reading • Chapter 15 of MS (pg. 211-220) 2nd Quiz • Quiz will be based on the material covered during weeks 4- 6 Activity • Introduction to group project – define a product and begin developing a manufacturing system including sequence of operations, required tooling, plant layout etc.
8	Developing a Product	Required Reading

	• Planning and developing a product • Planning and developing a production system • Obtaining resources	• Chapter 18 of MS (pg. 243-258) Activity • Continue with group project based on the material covered in class. Homework • Prepare a brief status report regarding the development of the project including goals
9	Developing a Production System • Selecting and sequencing operations with process flow charts • Plant layout and material handling • Required training • Tool design • Quality assurance	Required Reading • Chapter 19 of MS (pg. 259-273) Activity • Continue with group project based on the material covered in class. Homework • Prepare a brief status report regarding the development of the project including goals.
10	Common Tools for Quality Control • Introduction to various control charts and their interpretation	Required Reading • No textbook reading required this week Activity • Continue with group project based on the material covered in class including current status report. Homework • Complete the two histograms using the provided data and provide a brief analysis.
11	Introduction to Process Improvement • Lean Manufacturing • Concept of 5S • Concept of SMED	Required Reading • Use the internet or other sources to research the three process improvement concepts 3rd Quiz • Quiz will be based on the material covered during weeks 7 - 10 Activity • Continue with group project based on the material covered in class including current status report. Homework • Develop a 5S process for your kitchen drawer or tool box and provide pictures if possible.
12	Understanding the Value Chain Concept • Supplier relationships • Manufacturing cost control • Internal and external customers • How is value added • Push/pull Concepts	Required Reading • Use the internet or other sources to research the value chain concept Activity • Continue with group project based on the material covered in class including current status report. Homework • Determine which steps of the project add value to the product and which do not.
13	Importance of Sustainable Manufacturing • Reducing the emission of greenhouse gas • Using clean energy • Improving energy use • Reducing use of non-renewable or toxic materials and waste	Required Reading • Use the internet or other sources to research the bullet points Activity • Continue with group project including current status report. Discuss and incorporate ideas to make your process more sustainable and environmentally friendly
14	Manufacturing and You • Manufacturing Technology and the Future • Leadership and Employment • Impacts	Required Reading • Chapter 29 of MS (pg. 373-385) 4th Quiz • This final quiz will be based on the material covered during

		weeks 11 - 14 Activity • Finalize the project and prepare for presentation.
15	Presentation of Group Project	Activity • Class presents the results of the final project to a mock board of directors (instructor) and tries to get approval for production.