ME345 A1: Automation and Manufacturing Methods, Fall 2014

Instructor and Class Information

Instructor: Prof. Peter A. Zink, pzink@bu.edu, (617)358-1631
Office Hours, Location: By appointment, 730 Commonwealth Ave, EMA 202D
Lecture Times, Location: Mon 2-4, GCB 203 & Wed 2-4, GCB 204
Course GTF: Rui Dai, rdai@bu.edu, (617)961-2230
Lab Supervisor: Ryan Lacy, lacyr@bu.edu, 3-4274
Lab location, Hours: 750 Comm Ave, EPIC ADML; Mon – Fri: 8am – 10pm; Sat – Sun: 10am – 6pm;
Prerequisites: EK156: Design and Manufacture
Course Website: http://learn.bu.edu

Course Description:

An introduction to the major concepts and practices of modern manufacturing, including computer numerically controlled (CNC) machines, factory physics, robotic programming and control, real-time process control, computer vision, statistical process control (SPC), programmable logic control (PLC), production system design (LEAN), and computer simulation. Strong emphasis is given to hands-on laboratory experience, with a lecture component covering fundamental concepts and supporting the laboratory exercises and projects. Includes lab. 4 credits.

Course Objectives

- 1. Introduce principles, methods, and tools used in modern manufacturing.
- 2. Acquire practical experience in computer-aided design and process development through a series of laboratory exercises.
- 3. Understand the strategies involved in optimizing production system design & operations.
- 4. Use a team approach to design & manufacture a product using the ADML flexible manufacturing cell.

Required Textbooks

- The Goal:, E. M. Goldratt, North River Press, 3rd Edition (2004) or newer.
- Fundamentals of Modern Manufacturing:, Groover, 4th or 5th ed.

Grading:

- 1. Labs (pre-lab 20%, lab report 80%): [25%]
- 2. Homework [15%]
- 3. Quizzes (2) [15%]
- 4. Final Project [20%]
- 5. Manufacturing Discussions [5%]
- 6. Final Exam [20%]

Manufacturing Discussions/Presentations:

Each pair of students (two per lab section) in will pick a manufacturing process (specific or general) and identify 30 minutes of on-line video that illustrates the process. The topic should be related to modern manufacturing practices and problems. Each week, the class will watch videos (at home) for two of the processes, and then in class, the students who chose the topic will present/lead a discussion about them, filling in any details that weren't covered in the videos, and connecting the manufacturing processes to the course.

The student pair needs to fill in a google document by the third week of the course.

The objective of this assignment is to broaden your knowledge of state-of-the-art manufacturing practices, as well as to help you improve your presentation skills including answering questions (which are actually a compliment, since it indicates that you have created interest in the audience).

Grading: your presentation/discussion will be graded by your peers in terms of:

- presentation quality 30%
- technical quality 40%
- depth 30%

Presentations will begin Monday, October 7. There will typically be two presentations each Wednesday that we meet for lecture.

Labs:

NOTE: All labs will take place in the EPIC ADML facility. In order to access that facility, you must take and pass the EPIC Safety quiz: http://www.bu.edu/eng/current-students/epic/safety/

Below is a list of labs indicating the order in which they will be done. The class will be divided into two groups: those labs on the same line will be conducted in parallel (where groups A and B switch the following week). Students are expected to work in teams of two, though each student must hand in a separate pre-lab and lab report reflecting their own work.

Pre-lab Attendance: Since many of the labs involve operating machines, attendance to all pre-lab lectures the Wednesday before the lab is mandatory. If you know you will miss a pre-lab, please see the lab instructor ahead of time.

Grading for the labs will consist of: pre-lab write up = 20%, lab write up = 80%

Table 1: ME345 Labs			
Lab#	Title	Lab#	Title
1	Design, Theory, & Application		
2	Intro to CAD/CAM Mill	3	Intro to CAD/CAM Lathe
4	Manufacture of Milled/Turned Parts		
5	Intro to Robotics	6	Intro to Open CIM
7	Statistical Process Control	8	Vision Systems
9	Assembly	10	PLC
11	Simulation		

Quizzes and Exams:

Exams will be given roughly at the midway point and near end of the semester. Quizzes will be given periodically at the beginning of class. If you are late, you will not be given extra time. Both will be based on lectures, student presentations/discussions, articles given out in class, and other media.

General Class Policies

- Homework assignments are due *at the beginning of class* on the due date. All homeworks are weighted equally. Lowest homework score dropped at end of semester. Late homework and reports may not be accepted.
- It is your responsibility to check Blackboard to make sure that all quizzes and assignments have been recorded correctly. After two weeks from the time the assignment is returned there will be no change in grades.
- Except in cases of extreme emergency, making up of missed exams/quizzes will be permitted only with approval BEFORE the regularly scheduled date/time.
- Students must follow the BU Academic Conduct Code, which can be found at: http://www.bu.edu/academics/files/2011/08/AcademicConductCode.pdf. Any violation of this conduct code will be reported to the College of Engineering Academic Conduct Committee.

Course Project:

One objective of the course project is to design and manufacture a product using the flexible manufacturing system in the ADMS laboratory. A variety of different issues will be addressed in this project including: design of the product and its parts, development of manufacturing strategy and processes, CIM control, scheduling and cost estimation.

Description: Each team will design, manufacture, and race small RC cars. Teams will be required to design two distinct car bodies, optimize a manufacturing plan and manufacture at least one complete set of components. Each team must provide at least one complete, working, assembled car for grading purposes. The students in your weekly lab period are your team, and when you are done with the week's lab assignment, you should plan to work on your project. Each team will compete using their own car on a race course to test the success of their team's design.