ME345 A1: Automation and Manufacturing Methods, Fall 2015

Instructor and Class Information

Instructor: Prof. Peter A. Zink, pzink@bu.edu, (617)358-1631
Office Hours: E-mail for appointment, check http://bit.ly/1GTfzfj for availability,
Office Location: 730 Commonwealth Ave, EMA 202D (above CVS)
Lecture Times, Location: Mon 2-4, EPC 101 & Wed 2-4, EPC 204
Course Assistant & Grader: Valentina Toll-Villagra (vtollv@bu.edu) & Evan Liu (eliu2012@bu.edu)
Lab Supervisor: Ryan Lacy, lacyr@bu.edu, (617)353-4274
Lab location, Hours: 750 Comm Ave, Mon–Thu: 8am–10pm, Fri: 8am–6pm, Sat–Sun: 10am–6pm
Prerequisites: EK156: Design and Manufacture
Course Website: `http://learn.bu.edu` & Twitter feed: `https://twitter.com/profpzink`

Course Description:

An introduction to the major concepts and practices of modern manufacturing, including computer numerically controlled (CNC) machine programming, factory physics, robotic programming and control, real-time process control, digital imaging and machine vision, programmable logic control (PLC), statistical process control (SPC), production system design (LEAN), and computer-based process 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 manufacturing (CAM) and manufacturing process development through a series of laboratory exercises.
3. Understand the strategies and methods used to optimize production system design & operations.
4. Support a team effort to design & manufacture a product with the ADML flexible manufacturing cell.

Required Reading

- *The Goal:*, E. M. Goldratt, North River Press, 3rd Edition (2004) or newer.
- *Other reading posted to Blackboard*

Grading:

1. Labs (pre-lab questions 20%, lab reports 80%): [25%] (lowest pre-lab and lab grade will be dropped)
2. Homework [15%] (weighted equally, lowest score dropped)
3. Mid-term Exam* [15%]
4. Final Project (based on level of effort, presentation and report) [20%]
5. Final Exam* [20%] (comprehensive)
6. Manufacturing discussions, attendance and in-class quizzes* [5%]

*Exams will be given roughly at the midway point and near end of the semester. Quizzes may be given periodically at the beginning of class. Both are based on lectures, homework, discussions, labs, etc.

Manufacturing Discussions/Presentations:

Each pair of students (two per lab section) will choose a manufacturing process (specific or general) and identify 30 minutes of on-line video that illustrates the process. Each week, the class will watch the videos before class for two of the processes, and then in class, the students who chose the topic will present/lead a discussion, to connect the manufacturing processes to the course topics.

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 audience questions.

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/. Students must also present their pre-lab answers before beginning the lab exercises. Below is a table of labs indicating the order in which they will be perfomed. The class is divided into two groups: those labs on the same row 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 an individual pre-lab questions and lab report reflecting their own work.

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	Computer Integrated Manufacturing
7	Statistical Process Control	8	Vision Systems
9	Assembly	10	Programmable Logic Control
11	Simulation		

Course Project:

The course project entails the manufacture of a product using the flexible manufacturing cell in the ADML. This project includes: design of the product and its parts, development of manufacturing strategy and processes, CIM control, scheduling and cost estimation.

Each team will design, manufacture, and race small RC cars. Each team must provide at least one complete, working, assembled car for racing purposes. The (4) students in each weekly lab period comprise a team. Each team will compete using their own car on a race course to test the success of their team's design.

General Class Policies

- Make up of missed work permitted only with approval **before** the scheduled due date/time.
- It is the student's responsibility to ensure sure that all quizzes and assignments have been recorded correctly. After two weeks after an assignment is returned there is no change in grade.
- Students must follow the BU Academic Conduct Code: `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.