ME500 – Manufacturing Processes for Design and Production – Fall 2023

Instructor: Prof Chomyszak

When and Where:

Lectures: Tuesday and Thursday, EPIC B05, from 1:30-3:15

Lab: Section A: Tuesday morning from 9:00-10:45 in EPIC
Section B: Thursday morning from 9:00-10:45 in EPIC

Overview:

Design Intent is comprised of Function, Form, Material and Manufacturing Process, and they all have an impact on the cost, quality, and schedule of a product. This course will provide the student with hands-on experience in how manufacturing processes affect design decisions and details, and vice versa, and how the chain of design decisions affects the production cost. Students will spend considerable time in EPIC learning the fundamental manufacturing processes of: Milling, Turning, Cutting with Water Jet and Laser Cutters, Sheet Metal techniques, Welding, and Sand Casting, among others. These hands-on labs will augment the following classroom topics: How to Choose Materials and Manufacturing Processes, Tolerancing and GD&T, Design for Manufacturing and Assembly (DFMA), Predicting Production Cost, Automation, and Developing a Production Line. The course will end with a multi-week capstone project incorporating all the above.

Safety First:

Because this course makes extensive use of the Engineering Product Innovation Center (EPIC), all students must review a safety video and pass a safety quiz with a 100%. The quiz is an interactive part of the video and can be found at https://www.bu.edu/epic/engineering-product-innovation-center/safety/ . You are required to always follow ALL of the safety rules while in EPIC. The EPIC staff are vigilant and proactive regarding safety and there is little tolerance for safety violations.

Course Structure:

This is a hands-on course. Instead of quizzes, homework problems, and written exams, you will be expected to complete several hands-on exercises in conjunction with a team project. The lab exercises are designed around the creation of parts for a multi-component assembly. Every student is expected to complete all exercises. EPIC is open Monday through Friday from 8:00am to 6:00pm and can be utilized during those hours to work on unfinished lab exercises.

There are two lab sections of 15 students each. Each section will be divided into 5 teams of 3 students who will work together to complete all lab exercises as well as the final project. You will be issued one pair of safety glasses that you are expected to bring to every class and lab session. Please take good care of them.

Attendance:

This is an action-packed course, and we will be covering lots of important material throughout the semester. I will take attendance at the start of each lecture and lab. If you are present, you will receive a 1.0 for that session. If you are absent, you will receive a 0.0. If you are unable to make it to class but

send me an email in advance with a legitimate reason, then I will give you a 0.5 for being proactive. If you fall behind in this class, it will be very difficult to get caught back up so please attend all sessions.

Grading:

Attendance **10%**

As noted above, attendance is important.

Demonstrated proficiency utilizing the equipment in EPIC **20%**

This will be measured by how well you complete the lab assignments.

Final Project and Presentation **70%**

The Final Project and Presentation are a demonstration of your understanding of the impact of design decisions on function, form, material, process, cost, quality, and schedule. This portion of the final grade will be subject to a Peer Evaluation because it is a team effort. See the ME500-Peer Evaluation Form for more information on how this works.

The evaluation of the final project will be broken down as follows:

Understanding of manufacturing processes	17.5%	
Ability to choose appropriate materials	17.5%	
Ability to make functionally sound design choices	17.5%	
Ability to make economically sound design choices	17.5%	
Total		**100%**

Course Schedule:

The schedule for the course needs to be somewhat squishy due to the scheduling of EPIC being impacted by the many courses and labs that take place there. This will mainly impact the order of how the labs are completed. Nonetheless, here's a list of things that will be covered in the labs:

1. Measurement and Metrology
2. Manual turning using a lathe.
3. Manual milling using a milling machine.
4. CNC milling using a CNC milling machine.
5. Laser cutting
6. Waterjet cutting
7. Sheet Metal fabrication
8. Sand Casting
9. Granta Edupack (Materials Selection)
10. aPriori (Predicting Cost of Parts and Assemblies)

The lectures will be scheduled to augment the labs and will cover additional manufacturing processes. Several lecture periods at the end of the semester will be dedicated to design reviews during the design stages of the final project.

Academic Conduct:

All students will be expected to follow Boston University's code for academic conduct found here: https://www.bu.edu/academics/policies/academic-conduct-code/

Here's the long and short of my expectations:

1. Don't cheat!
2. Be helpful to your teammates.
3. Come to classes and labs on time.
4. Give credit where credit is due.
5. Observe good safety practices when you are in EPIC.
6. Be prepared to play hard, work harder, and learn a lot of useful stuff.
7. Feel free to ask lots of questions when the need arises.
8. Learn from your mistakes and persevere until you achieve success.
9. Think about how your work can be represented in your engineering portfolio.
10. Don't hesitate to email me if you want to meet with me: schomysz@bu.edu