

ME 360 B1: Mechanics of Materials

Spring 2012

Instructor and Class Information

Instructor: Dr. Peter A. Zink, pzink@bu.edu, (617)358-1631

Office, Hours: 730 Commonwealth, ENA209; M, T, Th, 2-3; email to set up other times

Class Times, Location: Tuesdays and Thursdays 4-6, CAS 216

GTFs: Kellas R. (KR) Cameron, kellas@bu.edu, PHO446, 617-784-4039,
and Yidou (Eric) Zhou, zydcomic@bu.edu, 617-309-0041

Prerequisites: ME359 - Introduction to CAD and Machine Components;
or ME407 - Computer Aided Design and Manufacture. Please talk to the instructor about exceptions.

Course Website: <http://blackboard.bu.edu>

Course Description: This course emphasizes the profitable conversion of product ideas to attractive products needed by customers. Course consists of a series of design projects, of increasing complexity, culminating in the development of an operations plan for product manufacture and delivery. Exercises include both product design and product manufacturing considerations. CAD and FEA software is used to design and analyze products. Resources for the exercises are presented in working studio sessions.

Approximate List of Topics to be Covered / Course Outcomes

As an outcome of completing this course, a student will:

1. Gain an increased understanding of production and service operations in manufacturing companies.
2. Develop an increased facility for using major CAD systems to do engineering design.
3. Learn about the creative process of product design and development, and other key steps that are required to turn a creative idea into a real commercial product.
4. Gain experience with product and process design for sheet metal, castings and plastic parts.
5. Develop experience with business ideation, demand confirmation and resource specification for designed products.
6. Gain experience in creating an operations plan for a manufactured product that specifies both product and process.
7. Gain experience and confidence in working in a team environment.
8. Gain a facility for producing well-organized and clearly written engineering reports.

Textbooks

No text will be assigned. Most of the course material that will be presented and discussed in class is drawn from the following two textbooks:

- *Product Design and Development*, Ulrich and Eppinger, McGraw-Hill Irwin, 5th Ed. 2012.
- *Materials and design: the art and science of material selection in product design.*, Ashby, M. F., and Kara Johnson. Butterworth-Heinemann, 2010.

Below are a few that you might also find interesting or helpful.

- *Product Design*, Otto and Wood, Pearson, 2001.
- *Engineering Design* Deiter, G. and Schmidt, L., McGraw-Hill 2008
- *Design Secrets: Products n* Haller, L. and Cullen, C. D., Rockport Publishers, Inc., 2004.
- *Engineering Drawing and Design* Jensen, C. , Helsel, J. D. and Short, D. R., (7th Edition), McGraw-Hill, 2008

Assignments, Quizzes and Presentations:

Possible Assignment Topics: There will be six assignments, with each one typically due within two weeks. In addition there will be two quizzes, each equal to half an assignment, plus a sketch notebook. The final grade is based on these eight tasks. Below are short descriptions of the six assignments (weights subject to change).

1. Analysis and report on a current product, introduced within the last 5 years, and sold by a public company. Considerable use of public databases will be made to analyze a variety of aspects of the product (1)
2. Rapid prototyping (weighted 1.5)
3. Analyze a product that was a revolutionary innovation (1)
4. Product failure analysis (0.5)
5. Manufacturing process presentation (weighted 0.5)
6. Design and development of innovative new product, plus market analysis (2)

The purpose of the notebook is to help focus on design and redesign issues. In particular, students should maintain sketches of good and bad designs, with appropriate explanations, plus assignments in class. Class assignments may be done on loose paper, while more finished drawings should be put in the notebook.

Quizzes: Will be given roughly at the midway point and near end of the semester, and will be my attempt at ensuring you read the assigned material, and attend lectures. I will strive to make the lectures relevant for your assignments, and to provide information helpful to your future careers. They will be based on:

1. lectures,
2. readings from articles given out in class, and
3. presentations on products that each student will make during the semester

If you miss class, then clearly (1) and (3) will be hard to make up. Consequently, if you miss a lecture, you are responsible for discussing/obtaining the information with a colleague in class. Some lecture material will be posted at the course website, but much will occur via discussion, requiring you to take notes.

Presentations/Contests: The format will be explained in more detail in class. The idea is that you bring in some *thing* that you find interesting and exciting. Besides describing the obvious novelty of the product, you should be prepared to add your thoughts on:

1. the virtues of the product (usually the easy part!),
2. where the product could still be improved, and
3. your views on the costs and manufacturability aspects of the product. The object is not to do research in great depth, but to come in having given these points at least some thought. Ideas for improvement will be solicited from the rest of the class after each presentation. The two ^{ψ} students with the best ideas each day will each receive a "point". At the end of the semester, the two students with the most points each get their lowest quiz grade changed to a 100

^{ψ} (the instructor reserves the right to add a third winner.)

Class Policies

- Assignments are due *at the beginning of class* on the due date. Late work will be worth 50
- It is your responsibility to check with the instructor or GTF to make sure that all quizzes and assignments have been recorded correctly, and that you are not missing any points on the grade sheet on blackboard. 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 quizzes will be permitted only with prior approval BEFORE the regularly scheduled quiz 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.

Grading

- Six assignments, together worth 75% of final grade
 - Two quizzes will be averaged together, worth $\frac{1}{8}$ of final grade.
 - One sketch notebook, worth $\frac{1}{8}$ of final grade.
- Note: Notebooks will be collected and "graded", but the grade not recorded (around midterm time).