

# ME360: Product Design, Fall 2014

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Instructor: Enrique Gutierrez-Wing, [esgw@bu.edu](mailto:esgw@bu.edu), (617) 358-1137, EMA 202c

Office hours: Mon, Fri 9:00-13:00 by appointment

Class Times: Tue, Thu 10:00-12:00

Class Location: EPIC Design Studio, 750 Commonwealth Avenue

GTF & Contact Info: Xue Ben, [xueben@bu.edu](mailto:xueben@bu.edu)

Prerequisites: ME359 - Introduction to CAD and Machine Components,  
or ME407 - Computer Aided Design and Manufacture.

CourseWebsite: <http://learn.bu.edu>

## Course Description

This is a project-based course aimed at developing skills for the design of engineering products. The emphasis of the course is on the use of analytical and technical skills for product design. Lectures and discussions will provide the elements to meet the challenges encountered by the student at each design stage. CAE Tutorials will be used to simulate the static, kinematic, dynamic and heat transfer behavior of engineering systems using engineering software, in order to support and improve designs. In the final project students will work in teams to develop a real product for an industrial partner.

## Learning Objectives

By the completion of this course, the student will:

- Analyze an adverse practical scenario and identify the problem(s) causing it.
- Identify the stages of a product design process: observation and problem definition, preliminary design, engineering analysis, detailed design, prototyping and testing.
- Work as part of a team through a structured design process.
- Apply engineering principles to guide his/her design decisions with respect to: statics, kinematics, dynamics and heat transfer issues, material selection, manufacturing processes and product usability.
- Build and test prototypes to assess the appropriateness of a proposed design.
- Interpret test data and use it to validate, improve or discard a proposed design.
- Communicate with a technical audience or a potential customer at the different stages of the design process through: design briefs, project proposals, sketches, engineering drawings, technical reports and group presentations.

## **Textbook**

No textbook will be required for this course, but reading materials and videos will be provided each week through the course Blackboard portal.

## **Grading**

Design Project [40%] will consist of the development of a product for an industrial partner.

- 1) This include some or all of the elements below:
  - Perform initial customer research, gather requirements, conceptual design.
  - Refine requirements, translate to functional, sketch concept ideas, formalize process communication.
  - CAD, tolerance analysis, physics, modeling, FEA.
  - Refine design, produce measured 2D drawings, bill of materials.
  - Create and test prototypes and models.
  - Incorporate feedback into design, develop manufacturing plan (processes, materials, costs, product success testing.)
  - Final report with analysis, test results and presentation.
- 2) Class activities and attendance [40%] includes CAE tutorials, design exercises, product presentations and quizzes.
- 3) Assignments [20%] based on investigations, assigned reading materials and practical tasks outside the classroom.

### Course contents by week

Week	Topic
1	Introduction to course, design process 1
2	Design process 2, design trends, communication
3	Modeling and simulation, static and kinematic (*), product teardown and analysis (Final project starts)
4	Modeling and simulation, dynamic and heat transfer (*)
5	Modeling and simulation, optimization (*) (Final project 1 <sup>st</sup> review session)
6	Materials selection
7	Prototype construction (*)
8	Prototype testing (*)
9	Test data analysis and reporting (*) (Final project midterm review and presentation)
10	Design for manufacturing and assembly
11	User-centered design
12	Fundamentals of human factors (Final project 3 <sup>rd</sup> review session)
13	Final project practical work
14	Final project final assessment and presentations, course assessments

\* Adjustments in schedule will be made according to student requirements

Each session: product presentation, lecture and class exercise.