DEPARTMENT OF BIOMEDICAL ENGINEERING
INSTRUCTIONAL INCUBATOR
UNIVERSITY OF MICHIGAN

BME Course Summary

Introduction

1. Course Information

Course Name	*Intro to Engineering Design*
Institution	*Boston University*
Course Number	*EK 210*
# credits	*2*
Meeting times	*Tuesdays 3:30pm - 5:15pm (1hr 45min)*
Is this a required course?	*Yes*
Pre-requisites	*None*
Target audience (e.g. 1st, 2nd year):	*2nd Year*
Textbook	*N/A*
Course Website (if it exists)	

2. Course Description

In the space below, "paste" the description of the course. This can be the actual description listed in the syllabus from the course.

A two credit introductory course to the principles of engineering design, intended to give second-year undergraduates a basic understanding of the process of converting a product from concept through design and deployment. Students will work in multi-disciplinary teams with time and budget constraints on externally sponsored design projects. Web-based lectures will cover topics concurrent with specific phases of the projects. The course will culminate in a "Design Competition".

This course is client-based, meaning that we are seeking projects from either companies or non-profits that are suitable for sophomores. We require six projects each semester and anticipate having eight teams of students (in groups of four or five) each working independently on one of the six projects.

3. Course Learning Objectives

In the space below, "paste" the course learning objectives if explicitly stated.

1. Reverse engineering and product teardown (I think this idea of reverse engineering to introduce Freshman and Sophomore students to design is really interesting)
2. Oral and written communications for engineers
3. Basic project management and working in teams
4. Problem definition and determining customer needs
5. Identifying product functions and establishing engineering specifications
6. Generating and evaluating alternatives
7. Prototypes, models, and proof of concept
8. Principles of industrial design and ethics in design
9. Engineering economics
10. Design for manufacturing and design for sustainability
11. Design portfolios

4. Fundamental Tools and Skills

In the space below, describe the fundamental tools and skills that are addressed in the class. For example, labvview, arduino's, the design process etc.

This class addresses foundational skills in oral and technical written communication for engineers, engineering sketching and drawing, project management, models and proof of concepts, using Arduinos and simple circuits for prototyping, ethics in design and the responsibility of the engineer, expertise in DFx (Design for Manufacturability/Assembly/Testing), and introduction to supply chains.

5. Exercises or Experiential Projects of Interest

Exercise/Project	**Project Overview**	**Learning Activities and Assessments**	**Required Resources for Project Completion**

Exercise/Project	Project Overview	Learning Activities and Assessments	Required Resources for Project Completion
EXAMPLE	Students make pulse oximeters.	**Learning Activities** • Students will use resistors and a bread board to … • In a short essay assignment, students explain… **Assessment** • Students complete a laboratory report that explains …	Function generator, resistors, oscilloscope….
1. Reverse Engineering Project	Student teams disassemble and analyze existing products	**Learning Activities** • Students spend three weeks to disassemble and analyze existing products such as HP printers or blood glucose meters **Assessment** • Students will be evaluated on an oral report of their reverse engineering project	
2. Prototypes, Models, and Proof-of-Concept	Students will begin to build physical models and prototypes	**Learning Activities** • Students will spend eleven weeks designing and building a prototype of an engineered product to meet the needs of an external "client". Past examples include low cost centrifuges for researchers, specialized dental illuminators **Assessment** • Students will be evaluated on preliminary oral design reviews (one on one with instructors) and a final detailed design reports (oral and written)	Students will have to learn shop safety and use Arduinos and simple circuits for building their physical models and prototypes

6. Additional thoughts

If you have any other thoughts about this course, but have not been able to reflect it elsewhere in the document, please feel free to do so here.

Boston University has an Engineering Product Innovation Center (EPIC), a 15,000 sq ft. makerspace that gives students an area to learn the skills necessary to design and build their own ideas and gain hands on experience in design, prototyping, and small-scale manufacturing. I think having a space such as this really makes it possible for the Freshman/Sophomore level introduction into the design process early on in their undergraduate studies. Perhaps when the LBME renovation space is finished, Freshman and Sophomores can take advantage of that space to be introduced early to the 3D printers, mechanical tools, and more before working with them in their Junior and Senior years.

https://www.bu.edu/eng/current-students/ugrad/sophomores/ek210/ - Course info

http://www.bu.edu/eng/files/2017/01/Voigt-Fall-2017-Syllabus.pdf - Course Syllabus