Course Syllabus Spring 2019
Product Design Bielmeier

Course Information

Time & Location:	3:30-5:15 pm Tuesday & Thursday, EMA 215
Professor:	Christie Bielmeier, PhD
Office hours:	730 Comm Ave (EMA) RM 207. M-R W 2:30-3:30 pm (By appointment)
Contact:	E-mail: cmb77@bu.edu
Book (Required):	na
Supplies:	Required to purchase (or forage) small components and electronics for group projects. The following items would be very useful for you to have: switches, knobs, servos, motors, h-bridge, leds, resistors, metal ruler, x-acto knife, construction paper, ….and a small toolbox/bag to keep things.
Electronics:	• Must have a laptop or tablet for daily class attendance, Arduino, and group projects. Must bring to class every day. • Software knowledge and access to CAD software (Solidworks or Creo). • Must bring Arduino hardware and software to class every day.

Course Description

Focuses on the use of engineering principles, simulation and physical models in product design. Hands-on exercises allow students to propose solutions to practical problems and to develop their ideas through the construction and testing of physical prototypes. Topics include Arduino sensing and control, mechanical metrology, principles of efficient mechanical design, manufacturing techniques, CAE tutorials for product simulation and prototype testing. 4 cr.

Prerequisites by topic:

- Physical behavior and computer simulation (CAD), Prototyping, and Design for manufacture and assembly

Goal:

- Apply engineering concepts, principles and tools to the design of products and devices comprised of mechanical and electrical components.
- Identify the relationship between design decisions and product cost, ease of use, manufacturability, reliability and functionality.

Course Learning Outcomes:

Upon completing this course, students will be able to:

1. Design mechanical components & joints with correct dimensions and tolerances to provide different types of fit.
2. Convey their ideas through sketches and other graphical means.
3. Systematically investigate design alternatives for both function and morphology
4. Apply human factors data to the dimensioning and shaping of objects.
5. Follow best practice 3D printing guidelines for the design of mechanical components.
6. Identify the main components and common applications of standard types of mechanism.
7. Design a mechanism using CAE tools.
8. Use stress distributions for the correct shaping of mechanical components
9. Integrate electrical and mechanical components in the design of a product
10. Organize the activities of a team for a design project.
11. Test physical prototypes to verify their compliance with design specifications.
12. Document and communicate a design process in written and oral form.
13. Estimate the manufacturing cost of a product.

Course Assessment

- Grading (Total 100%):

Homework 20%	Projects 50%
Journal Entry 20%	Class Participation 10%

Homework

- Homework is due on Tuesday at the start of class. You will submit via blackboard and bring soft or hard copy to class. No late home work is accepted.
- Student solutions should be original. Plagiarism will not be tolerated.

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Weekly Journal Entries

Journal Entries must explore an idea or concept discussed in this class. They must be your thoughts and words on any product development topic. A picture or sketch should be included. Also, you should also explain what tasks you completed on your group or individual project each week. Journal Entries are Due Saturday at 9 pm via blackboard.

Potential topics:

- My group is having a hard time doing this and here's some ideas on how I might solve the problem.
- Here's a SCAMPER, Morph or Pugh Chart for a new/existing product I was thinking about.
- I am the best! I solved this tricky problem using this method.
- I'm interested in the new material, manufacturing technique….and here's what I learned.
- I have an idea for a new mechanism.
- I wonder how this product was made?
- I created a simplified version of this product and here's what I learned.
- I have an idea for a new mechanism.
- Project Update.
- Here's how I would make this product better.

Projects

- A semester long group project will be completed to complement theory and application presented in the course.
- Projects must be completed in groups of 4-5 people. Projects from individuals will not be accepted. Milestones will be submitted throughout the semester. No late projects are accepted.
- All project requirements will be detailed in a project assignment sheet and most follow the layout described within the project assignment sheet.

Attendance & Class Participation

- Attendance is mandatory. If you are late, you are absent.
- Attendance will be taken via blackboard at the beginning of each class, and thus, you may want to download the Blackboard app to your smart phone.
- Class participation is based on your professional, active and constructive participation in the solution of the example problems in class, responses to general questions and your regular attendance of the class lectures.
- Absences for extenuating circumstances will be considered on a case-by-case basis and email notification prior to the absence is requested.
- You MUST act in a professional manner to all students while in the classroom and for all group projects. Class discussions can be passionate and opinionated, but should never make other students feel poorly. Bullying or belittling will not be tolerated. Attack the idea, not the person. Being able to take and give criticism is a skill and it will be developed in this class.
- BU's academic Conduct Code: http://www.bu.edu/academics/policies/academic-conduct-code

Course Schedule

Week	T Date	Topic	Ind. HMWK (Due T)	Group Project (Due R)
1	01/22	Introduction, Ideation, SCAMPER		
2	01/29	Engineering Design Process & Prototyping	A1: Dishwasher	Discussion & Pick Teams
3	02/05	Reverse Engineering & Good Design		GP1: ReqDoc
4	02/12	Design & Manufacturing with Metal		GP2: SRR Pres
5	02/21 R	Design & Manufacturing with Plastics	A2: Grabber	
6	02/26	Materials Selection & Adhesives		GP3: PDR Pres
7	03/05	GD&T	A3: Whistle	GP4: PDR System Proto
Spring Break				
8	03/19	Mechanisms & 4-bar Simulations	A4: Bearing Spec	GP5: PDR BOM & timeline
9	03/26	Arduino I—Digital IO	A5: 4-bar mech	GP6: CDR proto
10	04/02	FEA Analysis Simulation	A6: Ardiuno	
11	04/09	Thermal properties & Simulation		
12	04/16	Design for Quality & Manufacturing	A7: FEA	GP7: CDR drawing
13	04/23	Costing		GP8: TRR Pres
14	04/30	Final Pres Group Project & Demo		GP9: PRR Pres & Proto
15	05/07	No final Exam, but final report		GP10: PRR Report