DEPARTMENT OF BIOMEDICAL ENGINEERING
INSTRUCTIONAL INCUBATOR
UNIVERSITY OF MICHIGAN

BME Course Summary

Introduction

1. Course Information

Course Name	*Biomedical Engineering Design and Discovery*
Institution	*University of Virginia*
Course Number	**BME 2000**
# credits	**3**
Meeting times	**Tuesday OR Thursday 3:30 – 4:45 PM with asynchronous, web-based modules weekly or occasional in-person shop work**
Is this a required course?	**Yes**
Pre-requisites	Syllabus**: BME 2101 (Physiology I) and BME 2315 (Computational Biomedical Engineering);** Website**: CS 1110 (Introduction to Programming), PHYS 1425 (General Physics I), ENGR 1620 (Introduction to Engineering)**
Target audience (e.g. 1st, 2nd year):	**2nd Year Students (4th semester)**
Textbook	**n/a**
Course Website (if it exists)	**Not public (there is a class collab page)**

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.

From syllabus: There is no single recipe or procedure that always works in biomedical engineering design. You may start with nothing more than a problem you've identified, or with as much as a nearly complete design from a client. Sometimes you even begin with a technology, but no idea for what it might be useful. Regardless of where you begin, the end-points are always the same – *building* your solution, *testing* your solution, *reporting* the results, and *revising* your design as many times as necessary to make it work. This requires a wide variety of skills that all too often are not taught. The overarching objective of this course is for you to *learn some of the basic skills necessary to engage in the engineering design process for biomedical applications*, and for you to *gain an understanding of how the engineering design process works for biomedical products*.

From UVa website: Provides an overview of the BME discipline and major sub-disciplines (biomechanics, genetic engineering, tissue engineering, bioelectricity, imaging, cellular engineering, computational systems biology), covers conceptual and detail design processes, and introduces quantitative tools utilized throughout the BME curriculum. Includes formulation and execution of a major design project.

3. Course Learning Objectives

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

1. Develop an understanding of the biomedical device design process, including the social, regulatory, and business aspects particular to biomedical product design.
2. Develop a variety of manual skills that are useful for fabricating biomedical devices.
3. Learn how to use software to that is needed to engage in product design, and to enhance your written and graphical communications.
4. Work effectively as a member of a team to accomplish a goal.

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.

1. The engineering design process
2. Gantt charts and project management
3. Value propositions
4. Skills to accelerate your research and writing (Use Zotero and ImageJ for image analysis)
5. Design requirements
6. Medical product archaeology
7. Intellectual property
8. Regulation of medical products
9. Computer aided design (CAD) (Autodesk Fusion)
10. Risk, reliability, and failure
11. Fabrication skills, including
    a. 3D printing
    b. Microcontrollers and electronics (Arduino)
    c. Soldering of electronic circuits
    d. Preparing soft physical stock – table saws
    e. Shaping soft physical stock – band saws, drill presses, sanders

f. Metalworking – cutting, drilling, shaping, and threading
g. OPTIONAL advanced skills, including (MIG) welding, laser cutting, (CNC) milling

5. Exercises or Experiential Projects of Interest

NOTE: Limited information available for activities below. *Italicized font means that I made an educated assumption on what the activity entailed.*

Exercise/Project	**Project Overview**	**Learning Activities and Assessments**	**Required Resources for Project Completion**
1 Weekly Kaltura quizzes	*Students take online video quizzes to check student understanding.*	*Test class topics such as value propositions, design requirements, IP, medical product regulation, and risk*	Kaltura
2 Word / Zotero challenge	n/a	*Understand how to use citation management software*	Microsoft Word and Zotero
3 Gantt challenge (team)	n/a	*Understand how to create a Gantt chart.*	n/a
4 Materials / fasteners challenge (team)	n/a	*Fabrication practice*	*Table saws, band saws, drill presses, 3D printing, sanders*
5 CAD challenge 1	n/a	*Learn the basics of CAD in competitive setting*	Autodesk Fusion 360
6 CAD challenge 2	n/a	*Improve CAD skills in competitive setting*	Autodesk Fusion 360
7 Microcontroller challenge (team)	n/a	*Learn the basics of Arduino in competitive team setting*	Arduino
8 Product archaeology 1 & 2 (team)	n/a	(Based on Product Archaeology Design Challenges at Northwestern): *Dissect products to learn how they work; Understand factors that need to be considered in making design decisions, including cultural, economic, and environmental needs in different global contexts*	n/a

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.

This course seems to provide a broad spectrum of opportunities to expose second year students to design in BME. From the syllabus, it appears there is a 1.25 hr lecture each week, where the different challenges (CAD, microcontroller, Gantt, Zotero, materials/fasteners, and product archaeology) likely take place. It seems like students are required to do many online activities outside of the classroom by watching weekly videos and taking quizzes via Kaltura. The manufacturing skills also appear to be done outside of the typical lecture time during in-person shop work. To better understand the class and the course activities, I reached out to the professor (William Guilford) on 9/8/17 via email for more details about the activities of the course but have not yet received a response.