

# Biomedical Engineering Design Team

## Spring 2016 Syllabus

580.112, 580.212, 580.312, 580.412, 580.414

### Time/Location

Monday 3:00 – 4:30

Wednesday 3:00 – 4:30

See course schedule for details on course location. Most lectures will be held in Krieger 205 and most group work sessions will be held in the Design Studio East and West, Clark 213. Faculty mentor and committee meetings will be set up individually with teams and may be in conference rooms at the Homewood or School of Medicine campuses.

### Contact Information

#### Instructors

**Nicholas Durr, Ph.D.**

Course Director

Clark 208D

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**Robert Allen, Ph.D.**

Team Leader Course

Clark 208

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**Elizabeth Logsdon, Ph.D.**

Design Studio Director, TL Prep

Clark 217A (Design Studio)

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#### Teaching Assistants

**Daniel Ehrens**

Blackboard, grading, scheduling

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**CBID MSE Mentor** <Assigned to Teams>

CBID and Design Resources

You may contact us any time via email. Please include “[Design Team]” at the start of the subject. We will do our best to respond to emails within 24 hours. If you mark the email as “urgent” in the subject, we will respond as soon as practical. If your email pertains a specific subject listed under each of our contact information, email only that person. If you are unsure, you may email all three of the instructors at the same time. If you do not hear from us within two days, send us a reminder email. Please only contact us via phone in emergencies.

### Course Goal

The goal of this course is to learn and execute the design process by developing an innovative technical solution to an unmet clinical need.

### Course Description

This two-semester course will provide the instruction and resources for student teams to design solutions to real world clinical needs. Students will learn and execute the entire design process, from understanding a clinical problem, to demonstrating proof-of-concept functionality in a

prototype. The first semester of this course will be content-heavy with emphasis on understanding the clinical problem, creating and evaluating a sequence of concepts and prototypes, and project planning. The second semester of this course will include more time for group work and will require sophisticated prototype development and experimental proof-of-concept.

## Course Objectives

The primary course objective is for students to learn the biomedical engineering design process, in part by experiencing it. Teams are expected to deliver a professional-looking, functioning, proof-of-concept prototype that addresses their target clinical need.

By the end of the Spring Semester, students should be able to:

1. plan and execute an engineering and design project plan;
2. design and implement a proof-of-concept controlled experiment;
3. understand the basic components of a patent;
4. understand and execute the biodesign process;
5. incorporate engineering and clinical feedback into your project plan;
6. communicate your project motivation and status to experts and a lay audience; and
7. develop and maintain a design history file.

## Required Textbook

Xenios S, Makower J, Yock P. *Biodesign: The Process of Innovating Medical Technologies*. (aka **Biodesign**) New York: Cambridge 2010 (or newer 2015 version). [www.ebiodesign.org](http://www.ebiodesign.org)

Specific readings will be required for students on an as-needed basis.

## Grading Policy

The majority of each student's grade (~90%) in this course is based on the project grade, which is assigned to the *team* for its project. In addition to the project grade, your course grade will be influenced by your participation in course surveys (1%), and by anonymous peer evaluation from your teammates (10%). Lastly, the evaluation of your contribution to the project by the instructors based on team observation, peer reviews, your participating in Desk Reviews, and committee feedback can additionally influence your grade up or down (or not at all). This last adjustment will only be used in unusual cases (for example, if we get a consensus of comments like: "this student did not show up to most of our meetings and minimally contributed to our project", or "this student was a hero for this project and is the main reason we were successful").

## Grading Components

Committee Meeting #2	7.5%	Peer evaluation	10%
Committee Meeting #3	7.5%	Design History File	25%
Website (e-poster)	4%	Design Brief	15%
Participation in surveys	1%	Desk Review (4x, 7.5%/ea)	30%

*See Course Deliverables document for more detail on each assignment. Assignment sheets with additional detail will be giving out throughout the course.*

Grades for each assignment will be given a score out of 100. The weighted numerical score at the end of class will be rounded to the nearest integer and converted to a letter grade using the following breakdown:

100-98 = A+	89-87 = B+	79-77 = C+	69-67 = D+
97-93 = A	86-83 = B	76-73 = C	66-63 = D
92-90 = A-	82-80 = B-	72-70 = C-	<63 = F

*Example #1:* Project+Participation grade: 90, Peer evaluation: 100, no instructor adjustment.  
Course Score =  $90*90\%+100*10\% = 91$ . Course Grade: A-

*Example #2:* Project+Participation grade: 90, Peer evaluation: 80, no instructor adjustment.  
Course Score =  $90*90\%+80*10\% = 89$ . Course Grade: B+

*Example #3:* Project+Participation grade: 90, Peer evaluation: 50, instructor adjustment down 1/3<sup>rd</sup> grade due to consensus that student did not participate adequately in project.  
Course Score =  $90*90\%+50*10\% = 86$ . Minus 1/3<sup>rd</sup> grade. Course Grade: B-

## Mentorship

Each team will have access to a team of mentors with differing roles and responsibilities. It is the responsibility of the Team Leader to maintain regular contact with these mentors.

**Clinical Sponsor:** The clinical sponsor is usually a physician with practical experience in the area of the problem the team is developing a project around. Clinical sponsors are expected to be updated at least once every two weeks about project progress. Your clinical sponsor is often the most valuable member. They are typically professionals whose primary role is to care for patients and consequently may not be responsive to emails. Thus it is especially important to exercise professional etiquette (see below) when interacting with your clinical sponsor and to give them notice long before when you need their feedback or participation.

**Committee Members:** Each team will be assigned 1-3 committee members with domain-specific expertise in areas relevant to the individual project, such as global health, FDA regulation, or intellectual property. Committee members will be introduced to their teams in the first half of the Fall semester, will participate in the early-November committee meetings, and will make themselves available as needed for specific project advice to their teams.

**MSE TA:** Each team will be assigned a TA from the current CBID MSE program. We will try to match teams with TAs that have complimentary skillsets to the team and/or project-specific expertise. These TAs will be available to you as needed and will also

schedule regular weekly or bi-weekly meetings with your team depending on your mutual availability.

**Course TA:** The course TA will assist the instructors in maintaining the blackboard site, organizing course logistics, grading the logbooks/websites, and compiling assignment grades and feedback.

**CBID Mentor:** Each team will be assigned a mentor from among the CBID faculty. The role of this mentor is to give advice on the design process with respect to your specific project and connect you to resources you may need access to.

**Other Design Team Students and Teams Leaders:** Design Teams is *not* a zero-sum game. Teams are encouraged to share resources and strategies that they find helpful with each other. We also encourage all students to constructively critique each others work.

## Professional Etiquette

Design Team students are ambassadors for Johns Hopkins University and the CBID program. To build our program and maintain the active mentor involvement that our course requires, we rely on the professional behavior of our students. Be respectful of your mentor's time by being early and prepared to meetings and doing background reading on your own before asking questions. Be courteous by addressing your clinical sponsor with their preferred title. Lastly, be prompt in your replies to them and make sure to keep them updated on your projects!

## Academic Misconduct Policy

Students should read policies pertaining to academic misconduct and netiquette at <http://ep.jhu.edu/genpolguid>. Please read below how the Academic Misconduct Policy applies to your class.

If you include direct quotes from any source in your discussions, written assignments, or any other submission for which you will receive a grade you must provide attribution. Students using published material without reference, or copying the work of another individual will receive a warning at the first incident. Any further incidents will result in the student receiving a zero on the assignment and the matter will be referred to the Associate Dean. Contact us if you have any questions, no matter how slight, about this policy, or if you have questions about a particular assignment.

## Plagiarism

Plagiarism is defined as taking the words, ideas or thoughts of another and representing them as one's own. If you use the ideas of another, provide a complete citation in the source work; if you use the words of another, present the words in the correct quotation notation (indentation or enclosed in quotation marks, as appropriate) and include a complete citation to the source. See the course text for examples.

**Students with Disabilities**

Notify the instructor within the first week of class for accommodations in accordance with University regulations.