

COURSE DESCRIPTION

Course	BE 428 Device and Diagnostics Design
Semester	Spring 2018
Hours	Tuesdays and Thursdays, 3:30 pm – 5:15 pm
Location	LSE, Room B03-04
Website	https://learn.bu.edu
Instructor	Dr. Mario Cabodi, Research Assistant Professor, BME
Email	cabodi@bu.edu
Office	ERB 331, 44 Cummington Mall
Office Hours	by appointment
Teaching Fellow	Mr. Joshua Kays, Graduate Research Assistant, BME
Email	jkays@bu.edu
Office	PHO, 8 St. Mary's Street
Office Hours	by appointment

COURSE DESCRIPTION AND APPROACH

BE 428 is a project-based course developing fundamentals of the design aspects of biomedical devices and diagnostics. The course is designed for undergraduates in their Junior and Senior years and satisfies a course elective requirement for the Technology Innovation concentration. Case studies of biomedical device designs and hands-on prototyping sessions are used extensively throughout the course. These, as well as guest lectures and discussion sections, are designed to encourage students to consider the broader social contexts of engineering and design. Basic theory, homework, and brainstorming sessions will be applied towards problem identification, solution selection, and failure mode evaluation.

During the first week of class, students will be assigned to Final Project teams. Students will work extensively with their teammates to create a prototype solution to a medical device and/or diagnostic challenge and will provide a written and oral presentation of this work to clinicians, designers, and engineers from BU and the Boston area at the final class session in lieu of a final exam. The Final Project will require intensive teamwork outside of class hours. Due to differences in opinions as well as learning and working styles, individuals in the groups will likely be frustrated, anxious, and/or confused at various times throughout this process. However, they are also expected to develop interpersonal skills including negotiation, communication, trust, creativity, and problem solving, to further the group project goal. Peer evaluations of individual leadership, group progress and cohesiveness, will be conducted throughout the course to monitor and deal with any issues that may arise. Ultimately, teams will develop written and oral presentations that they can be proud to use as examples of both their design and teamwork skills in portfolios and career applications.

COURSE OUTCOMES

Blooms taxonomy: Remember → Understand → Apply → Analyze → Evaluate → Create

1. Recall design process steps
 2. Identify and correct an ineffective design question
 3. Develop and revise product design specifications
 4. Utilize iterative design and user-centered design methods
 5. Critique a design specification based on the design requirements
 6. Evaluate designs based on failure modes and effects analysis (FMEA)
 7. Work effectively in teams to develop a working model prototype
-

REQUIRED MATERIALS

Final Project Group Design Journal

Starting with the first week that your Final Project Groups are assigned, your group will create a journal that will be updated weekly to keep track of your design progress throughout the course. Design journals should be updated weekly and include sketches of ideas, questions, calculations, photos and drawings of concepts. They will enable us (and you) to keep track of progress, meetings, ideas and inventions during the course. Journals will be assessed weekly to evaluate progress.

There are no required books for the course.

SUPPLEMENTAL MATERIALS

As a reference, this textbook will be on reserve at the Science and Engineering Library

Biodesign: The Process of Innovating Medical Technologies. Yock, Zenios, Makower. 2nd Edition. Cambridge University Press (ISBN: 978-1107087354)

Technology

Technology is used extensively in the course. Laptops, tablets, smartphones, etc. are welcome in class. However, do not let them be a distraction to you or your classmates. Unless I specifically ask you to read a case study online, work on the Citrix server, or look up relevant information for an activity, *please do not spend time on your gadgets during lecture.* I will mention ahead of time when I would like you to use your electronics. Please respect these requests, and we will all get more out of class.

EXPECTATIONS AND REQUIREMENTS

Attendance: Each week of this course will include a variety of activities: lectures on engineering topics, invited lectures by other professors and researchers working in the medical device field, hands-on prototyping, discussions, and presentations from your fellow classmates. Thus, it is VERY IMPORTANT to attend every class. You must let us know in advance (via email) if you plan to miss a class, and there is a very high bar for what constitutes a good excuse (“I have a wedding in Idaho” is not good enough). Being absent for a design review or presentation will result in a 0 grade unless the

instructors are notified AHEAD of the listed date. An individual presentation may be rescheduled in special cases.

Blackboard Learn Site: All course documents, assignments, and announcements will be available on the Blackboard Learn course site. Submit all assignments and evaluations to the Blackboard site. Just to be clear: submit all assignments and evaluations to the Blackboard site. It is your responsibility to ensure that submissions are completed and accepted by Blackboard Learn. Do not email them to us.

Academic Honesty: Plagiarism of ANY KIND will not be tolerated. Any assignment that exhibits plagiarism, copying, cutting and pasting, teamwork when teamwork is precluded will result in an F (zero credit) on that assignment. Depending on the seriousness of the offense, an F in the course may result. The Academic Conduct Code is available at <http://www.bu.edu/eng/current-students/ugrad/faq/>.

Communication: Periodically, anonymous course evaluations will be given to ensure teaching methods are effective and all learning styles are accommodated. Students are expected to take responsibility for their learning and to communicate opportunities for improvement in the course so that they can be addressed. As they say in the diagnostics field, "You can't fix it, if you don't know it's there." *Peer evaluations are formally performed at separate times throughout the course.* While we are available to mediate major issues, teammates are expected to first communicate with one another about challenges before they become problems, and to support each other throughout the project.

Disability Accommodation: Reasonable accommodations for eligible individuals will be provided in accordance with Boston University policies as described:
<http://www.bu.edu/academics/policies/disability-accommodation/>

Re-Grading: Requests on exams and assignments must be submitted in writing within one week of grades being returned and only after the solutions are posted. A rationale for re-grading should be included. Points will only be changed for errors made in calculating final scores or grading that did not follow the grading rubric for that assignment.

Official BU Policy on Re-Grading: "This policy provides a means for a student to contest a final course grade received in a credit-bearing Boston University course when that grade is alleged by the student to be arbitrary. Grading is the prerogative of the faculty and is based upon a student's performance against a clearly articulated set of assignments, expectations, and standards.

Arbitrary grades are defined as those:

- assigned to a student on some basis other than performance in the course; or,
- assigned to a student by resorting to unreasonable standards different from those which were applied to other students in that course or section of the course; or,
- assigned to a student on the basis of criteria that are a substantial, unreasonable, and unannounced departure from the instructor's previously articulated standards.

Issues that do not meet one or more of these criteria of arbitrariness are not appropriate bases for a grade appeal under this policy. Only final course grades may be formally appealed."

Due dates: All assignments should be submitted by 11:59 pm EST on the day that they are due: electronic copies uploaded to Blackboard Learn site. In the unlikely event that Blackboard Learn should fail, you may email the assignments to BOTH Instructor and Teaching Assistant.

Any assignment handed in late will lose 10% after one day, 25% after two days, and will not be graded after three days.

ASSESSMENT (GRADING)

Your final grade will be determined by a combination of individual and group assignments:

Individual Assignments (30%):

- Lab journal entries: 2 entries per team member over the course of the semester
- Device and Diagnostics Write-up
- Solidworks + Materials Day assignment

Peer evaluation (10%)

- Group work, Rotating leadership.

Class Participation (10%)

- Attendance, In-class prototyping sessions, Case studies discussions, Interviews

Group Assignments (50%):

- Design Reviews and associated write-ups (30%)
- Final Presentation (10%)
- Technical achievement grade (10%)

Assignments: All individual assignments are to be performed separately. Group assignments are to be completed with input and agreement from all teammates; all members of the team will be expected to be able to explain the assumptions and reasoning behind the submitted work.

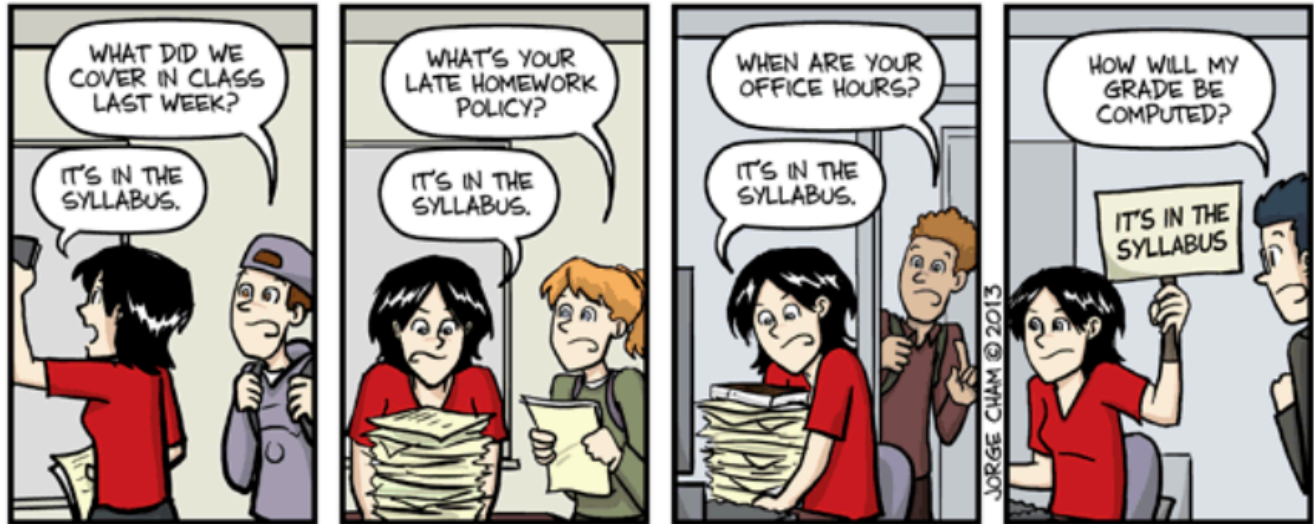
Peer evaluation: Peer evaluations of contributions to group work will constitute 10% of individual grades on the project. These points are to ensure that students take an active role in the learning process and are fully engaged in all aspects of the course. Each team member will assume a Team Leader position on a rotating basis, and will be in charge of a design review or the final presentation. The peer evaluation score will include an assessment of each member's participation level, quality of work, and leadership skills.

Class Participation: This portion of final grades includes attendance, active participation during class discussions and prototyping sessions. You are also expected to participate fully in providing feedback to other teams during their design review presentations.

Design reviews and reports: 3 separate reviews resulting in a group grade: 8-minute presentations to the class with 3 minutes discussion for each group focusing on the assigned review topic. Each presentation and associated report is worth 10% of the final grade. Written reports parallel the presentations and follow the formatting described in the assignments section of Blackboard Learn.

Final presentations: In lieu of a final written report, each group will give 8-minute presentations to clinicians, designers, and engineers from the Boston area with 5 minutes Q&A. You will cover the design question, approach, and development of the Final Project.

Technical achievement: *final prototypes from each group will be evaluated against the group's initial needs statements and design specifications. Will your final proposed solutions meet the design requirements?*



IT'S IN THE SYLLABUS

This message brought to you by every instructor that ever lived.

WWW.PHDCOMICS.COM