Course Number and Title: ENG EC463 - Senior Design I

Instructor Name: Alan Pisano (lead professor) Osama AlShaykh Michael Hirsch Office Location: PHO 522 (Pisano)

Contact Information: <u>apisano@bu.edu</u> <u>osama@bu.edu</u> mhirsch@bu.edu Course Dates: Every Fall Semester Course Time & Location: TR 3:30-5:15 PHO 206 & Senior Design Lab PHO 111/113 Course Credits: 4

Office Hours: (Typical) T 1:30-3:00; W 2:00-3:30 (Pisano - varies each semester)

TA/TF/Learning Assistant information, if relevant: Course has 4 assigned 2nd year (plus) PhD students to help mentor the students. In addition, writing tutors from the Writing Program are available to provide feedback and guidance to the students on their reports.

Prerequisites: CAS WR150 (or equivalent)

Course Description.

EC463 is a required "team-based" project design course. Projects are solicited from a variety of sources (companies, non-profits, alumni, faculty) during the summer and students select from those provided to the class. In addition, student-defined projects are solicited and some are also selected. The only project requirements are that they are sufficiently challenging, suitable for EE/CE Seniors to work on over 2 semesters, have a "client" who needs the final built project, and have a societally relevant content recognizing the Societal Engineering thrust of the college. Students are assigned to projects based on their preferences, skill-sets, and the specific technical challenges of the project. Most teams are comprised of 5 students and are a mix of both EE and CE students. A few teams are also interdisciplinary with BME and ME. The students learn by "active learning" as well as being guided/mentored by the faculty and TAs. The main deliverable of this first semester is a "Final Report (First Semester Report)" which documents their design requirements, conceptualizations, selection among alternate approaches, prototype design (HW/SW), testing, and plans for completion the following semester (EC464). Additionally, each team must produce a physical prototype and demonstrate the ability of their prototype to meet the requirements as specified by their "client".

This course fulfills a single unit of each of the following Hub areas: Writing Intensive; Research and Information Literacy (Toolkit); Digital/Multimedia Expression.

Writing Intensive:

Students will learn by writing small incremental assignments that they will build upon by subsequently revising and adding additional sections. Several key reports (both team-based and individual) will be generated during the semester. Students will receive in-class instruction in reading, researching, interpreting and ethically citing scientific literature. Reports will undergo an intensive revision process in which they write sections, receive feedback, revise sections, and add new sections for each assignment. Style guides will be provided so that their work can be published in technical journals.

Digital/Multimedia:

Students will make a video of their project during the semester and will receive feedback on both the technical expression of their project as well as video mechanics such as clarity, focus, effective use of audio etc. They will also learn how to develop and incorporate graphics into their reports and presentations using state-of-the-art software tools and communication platforms. Several design reviews

will provide feedback to the students not only on the technical content of their presentations, but also on the effectiveness of their slides and videos.

Research and Information Literacy:

Students will be introduced and instructed on methods to obtain relevant information from disciplinespecific sources. They will learn to develop arguments to effectively address research and design challenges. They will then develop and execute a plan to demonstrate understanding, evaluate and interpret outcomes, and communicate their findings.

Other Outcomes (e.g., School, Department, and/or Program Outcomes)

EC463, and its follow-on course, EC464, are required of all EE and CE Seniors in the ECE department. It is a key requirement for ABET accreditation of the Electrical Engineering and Computer Engineering degree programs .

Instructional Format, Course Pedagogy, and Approach to Learning

The course utilizes didactic lectures to guide the students in all phases of the engineering design process, and includes substantive out of class group work culminating in a final first semester report as described above. Extensive individual feedback and mentoring specifically related to the student's assigned project.

Books and Other Course Materials

The only recommended textbook is: Dym, Little, Orwin, (2014), *Engineering Design – A Project Based Introduction*, John Wiley and Sons.

Courseware

Blackboard Learn is used for all course material.

Assignments and Grading

Performance is assessed on the following listed deliverables. Each element will have a specific set of assessment items in an evaluation rubric that will be distributed to you beforehand in Blackboard Learn.

Grading Elements (T – team grade) (I – individual grade)

Percent Item

- 8 Problem description & requirements review (PDRR) (T)
- 5 Mini-Project (I)
- 20 First prototype testing (T) (5 for test plan 12 for in-lab testing 3 for test report)
- 5 Testing Video (T)
- 25 First Semester Report (T) (Includes 5 points for "Demo Day")
- 20 Engineers logbook (I) (Graded twice 10 each)
- 4 Team contract (I)
- 6 Personal Progress report (I)
- 5 Attendance (I)
- 2 Seminar Attendance (I)

Resources/Support/How to Succeed in This Course:

- 1. Faculty and TAs both formally and informally mentor both individual students and teams.
- 2. Accommodations for Students with Documented Disabilities: If you are a student with a disability or believe you might have a disability that requires accommodations, please contact the Office for Disability Services (ODS) at (617) 353-3658 or access@bu.edu to coordinate any reasonable accommodation requests. ODS is located at 25 Buick Street on the 3rd floor.

Community of Learning: Class and University Policies

- 1. Course members' responsibility for ensuring a positive learning environment (e.g., participation/ discussion guidelines). These are communicated to the students at the first class and follow ECE department guidelines.
- 2. Attendance & Absences. Students loose one point out of the course total of 100 for each unexcused absence. Prof. Pisano can excuse students for any valid reason (such as illness, job interviews, etc). Affirm Policy on Religious Observance.
- 3. Assignment Completion & Late Work. These are specified on Blackboard Leard including due dates for all assignmnts and penalties for late submissions.
- 4. Academic Conduct Statement, including expectations for academic honesty, reference to consequences for cheating or plagiarism, course-specific guidelines for, e.g., extent of allowable collaboration on assignments, and URL for Academic Conduct Code: <u>https://www.bu.edu/academics/policies/academic-conduct-code/</u>

EC463 Class Meetings **BUT** Fall 2022 V1.0.1 08/02/22

Week	Dates	Senior Design Class Topics	Deadlines / Notes
1	9/6	Course overview: grading, logbooks, GitHub. Miniproject teams assigned	ATTENDANCE TAKEN ALL CLASSES
1	9/8	Miniprojects flipped classroom (SW focus) Prof. Osama	
2	9/13	Miniprojects flipped classroom (HW focus) Prof. Hirsch	
2	9/15	Entrepreneurship & BUild Lab (Peter Marton) Main projects descriptions given to class	Individual project preferences by 9/18 11:59 PM
3	9/20	Intellectual Property and Patents (Mike Pratt)	
3	9/22	Main project teams announced & TEAM PHOTOS Review of Design Process & Requirements (Pisano)	Miniprojects due 9/23 11:59pm
4 Team Lead 1	9/27	Writing Workshop (Writing Tutors)	
4	9/29	PDRR Oral Presentations - PHO206 (10 min /team)	
5	10/4	PDRR Continues – PHO206 (10 min /team)	
5	10/6	PDRR Continues – PHO206 (10 min /team)	
6	10/11	NO CLASS – MONDAY SCHEDULE	
6	10/13	Informal Design Reviews – Week 1 (Starts on Thursday)	LOGBOOKS GROUP A (Last day of review cycle) PDRR Reports (T) Due 10/14 11:59 PM (submit to writing tutors)
7	10/18	Informal Design Reviews – Week 1	
7	10/20	Preparation for Shark Tank	LOGBOOKS GROUP B (Last day of review cycle)
8 Team Lead 2	10/25	SHARK TANK Trustee Ballroom 6-9 PM Class will not meet (3:30-5:15)	
<u>8</u>	10/27	Informal Design Reviews – Week 2	LOGBOOKS GROUP C (Last day of review cycle)
9	11/1	Informal Design Reviews – Week 2	
9	11/3	Informal Design Reviews - Week 3	LOGBOOKS GROUP D (Last day of review cycle)
10	11/8	Informal Design Reviews – Week 3	
10	11/10	PRE-TEST PROTOTYPE (Working Session)	LOGBOOKS GROUP A (Last day of review cycle) Draft First Semester Report to Writing Tutors due 11/11 by 11:59 PM
11	11/15	1st PROTOTYPE LAB TESTING	
11	11/17	1st PROTOTYPE LAB TESTING	LOGBOOKS GROUP B (Last day of review cycle)
12 Team Lead 3	11/22	******** NO CLASS ********	All Test Reports (T) Due Sunday Nov 20 by 11:59 PM
12	11/24	Thanksgiving Holiday (NO CLASS)	
13	11/29	Formal PDRs 3 Rooms Simultaneous Presentations	
13	12/1	Formal PDRs 3 Rooms Simultaneous Presentations	LOGBOOKS GROUP C (Last day of review cycle) All team contracts due (12/2) by 11:59 PM
14	12/6	Formal PDRs 3 Rooms Simultaneous Presentations	
14	12/8	***** VIDEO DEMOS DAY *****	LOGBOOKS GROUP D (Last day of review cycle) Individual Progress Reports (I) due Dec 9 11:59PM First Semester Report (T) due Sun Dec 11 9:00AM