University of California Riverside
BIEN 10
Fall 2015
4 Units

Department of Bioengineering
Overview of Bioengineering
Instructor: Dr. Christina Birch

Meeting times & locations:	**LEC – MF 5:10-6:00pm**	**CHUNG 138**
	PRC – W 5:10-8:00pm	**TBD**
	DIS – F 9:10-10:00am	**INTN 1002**
Office Hours:	Dr. Birch: MWF 2:00-3:00pm Bourns A127 (or by appointment)	
	TAs – Christopher Horner: TBD	
	Dieaniera Erudaitius: TBD	
Contact Information:	Dr. Birch: birch@mit.edu	
	TAs – Christopher Horner: chorn003@ucr.edu	
	Dieaniera Erudaitius: derud001@ucr.edu	
Prerequisites:	CHEM001	

Course Description: *Provides an overview of the various aspects of bioengineering and introduces bioengineering design. Illustrates the application of engineering principles for the design of various products to health science industries. Covers diagnostic instruments, artificial organs, biotechnology, and cell and tissue engineering. Covers engineering ethics. Requires a term project and oral presentation.*

Course Objectives:

- During this course, students will propose their own ideas to solve real problems in the field of Bioengineering. They will assemble teams of their peers to tackle designing, troubleshooting, and building prototypes to demonstrate the potential of their proposal.
- Students will gain exposure to research at the forefront of bioengineering and will be familiar with the research projects of the Bioengineering faculty.
- Students will be able to confidently analyze scientific literature and perform preliminary market research to identify problems and potential needs across disciples that can be solved using Bioengineering skills.
- Students will gain confidence in their scientific communication skills and will be able to communicate more effectively through presentations, written media (abstracts, manuscripts), and visual aids (posters, slide deck).

Grading:

Assignment	Component / Percentage	
Homework	6 x 5%	30%
Discussion Section Participation	--	10%
Communication assignments	Manuscript (part 1)	5%
	Team abstract	5%
	Team poster	10%
	Manuscript (Final)	10%
Team Project / Prototype	Completion	2%
	Degree of difficulty/thoughtfulness	3%
	Participation	5%
	Design Notebook	10%
Team presentation	--	10%

Homework: Late assignments will be accepted with a -10% penalty for every day beyond the due date. Homework can be a collaborative effort but students must submit their own original work and solutions.

Writing Assignments: Bioengineers must be able to communicate technical information effectively in a variety of formats. You will gain experience communicating in written forms (abstract, a "mini" manuscript) and visual forms (group poster, group presentation).

Final Presentation: Your team will present your project and demonstrate your prototype at the end of the quarter in a style similar to a short talk at a scientific conference or a pitch to a venture capitalist at an entrepreneurship competition.

Student Responsibilities:

Participation: Students are expected to attend lecture, practicum, and discussion sessions and to actively participate by asking questions, suggesting solutions, and helping their fellow students learn. Please respect your fellow students by being on time.

The focus of this course is the creation of a prototype or method to solve a problem in bioengineering. Students will work in groups and every student must contribute to the group project overall. Each student brings a unique set of experiences, passions, and ideas to the table and every student can contribute value to a project. You are each other's best resource! Build a strong team and you can solve any problem.

Engage. Get creative. You're a bioengineer; keep thinking and talking about what you might FIX / MAKE / DO … with the skills you're learning.

COURSE SCHEDULE

Week	Dates	Topics	Assignments*
0	9/25	LEC: Course overview, Bioengineering problems NO DISCUSSION SESSION	
1	9/28-10/2	LEC: Evolution of bioengineering; Major questions, New technologies PRC: Skills overview, Literature search, Design notebooks	HW 1 – Problems/Solutions in Bioengineering worksheet
2	10/5-10/9	LEC: Bioengineering design principles; Bioethics PRC: Idea pitch, team "speed dating", Project elevator pitches	HW 2 – Project proposal, team bios
3	10/12- 10/16	LEC: Microcontrollers: Circuits, programming basics PRC: Microcontrollers – Arduinos	HW 3 – Microcontroller worksheet
4	10/19- 10/23	LEC: Diagnostics: Human physiology; Bioinstrumentation: Biosensors PRC: Design & Fabrication – SolidWorks & 3D printing	HW 4 – Project Blueprint; Parts order form due
5	10/26- 10/29	LEC: Biomechanics & Prosthetics PRC: Design Project	HW 5 – Progress report
6	11/2-11/6	LEC: Therapeutics: Biological Engineering PRC: Design project	**Manuscript (part 1)**
7	11/9- 11/13	LEC: Bioprocess Engineering PRC: Design project	HW 6 – Progress report
8	11/16- 11/20	LEC: Scientific Communication PRC: Design project	**Project abstract**
9	11/23- 11/25	LEC: Technology ventures & entrepreneurship PRC: Design project – Assign final manuscript NO CLASS FRIDAY (11/27 HOLIDAY)	**Team Poster (due 11/30)**
10	11/30- 12/4	LEC: Team Presentations PRC: Team Presentations	**Manuscript (final) Due 12/4 @ 5pm**
11	12/9	**DEPARTMENT BIODESIGN DEMO NIGHT - TBD**	**Finals Week**

*Assignments are due on the Friday of the week indicated, 1 week after being assigned, unless otherwise noted (team poster, final manuscript).