BME 180B BME Engineering Design
Winter 2023

Course Descriptions

BME 180B – Design strategies, techniques, tools, and protocols commonly encountered in biomedical engineering; clinical experience at the UCI Medical Center and Beckman Laser Institute; industrial design experience in group projects with local biomedical companies; ethics, economic analysis, and FDA product approval. In-progress grading. Prerequisite: BME180A.

BME 180B Instructors

Prof. Michelle Khine, **mkhine@uci.edu (mailto:mkhine@uci.edu)**

Prof. Christine King, **kingce@uci.edu (mailto:kingce@uci.edu)** , *Note: on maternity leave*

Teaching Assistants

Yasaman (Yassi) Fatapour, **yfatapou@uci.edu (mailto:yfatapou@uci.edu)**

Tai Le, **tail3@uci.edu (mailto:tail3@uci.edu)** .

Emily Wagner (prototyping) , **ewagner2@uci.edu (mailto:ewagner2@uci.edu)**

Office Hours

By appointment via E-mail

Khine's Office Hours: Mon: 10-12, 1:30-2:30 (614 Aldrich Hall)

Dr. King's Open Lab Hours: TBA - will be announced by Grace Surber and Francis Ung, Location: MSTB 214

Fabrication Lab Hours

Fabrication Lab Room Hours and Location:

Graduate and Undergraduate Supervisors: Emily Wagner, **ewagner2@uci.edu, (mailto:ewagner2@uci.edu,)** Francis Ung, **ungfp@uci.edu (mailto:ungfp@uci.edu)**

Location: Engineering Tower (ET) Room 436

Open Hours:

Mondays: 1pm-4:30pm by appointment

Tuesdays: 9am-11am

Wednesdays: closed

Thursdays: 9am-11am

Fridays: 9am-11am

Testing Lab + Meeting Room Hours and Location:

Multipurpose Science and Technology Building (MSTB) room 214

Undergraduate Supervisor: Francis Ung, **ungfp@uci.edu (mailto:ungfp@uci.edu)**

Open Hours:

Mondays: closed

Tuesdays: 3:30pm-5:00pm

Wednesdays: 11:00am-1:00pm

Thursdays: 3:30pm-5:00pm

Fridays: 12:00pm-1:00pm

Lectures

Tuesdays, Thursdays 5:00PM to 6:20PM

Location: Biological Sciences III (BS3), **Room 1200 (https://classrooms.uci.edu/classrooms/bs3/bs3-1200/)**

***Attendance is MANDATORY!*

Prerequisites

BME 180A/B/C must be taken in the same academic year. Senior standing only.

Required Text: None

Reference Texts

Paul Yock, Stefanos Zenios, and Josh Makower, eds., *Biodesign: The Process of Innovating Medical Technologies, 2nd Ed.*, Cambridge University Press, 2015.

Clive L Dym, Patrick Little, and Elizabeth Orwin, *Engineering Design: A Project-Based Introduction, 4th Ed.,* Wiley, 2014.

Grading Policy

Attendance:	10%
Homework:	50% (HW1: 7%, HW2: 8%, HW3: 15%, HW4: 10%, HW5: 10%)
Presentation:	20% (15% overall, 5% individual)
Poster:	10%
Peer evaluation:	5%
Mentor evaluation:	5%
Course Survey Bonus:	1%
Team Lead Bonus:	3%

Course Learning Outcomes

BME 180B – Upon completing the course, students will be able to:

1. Demonstrate leadership and teamwork skills in a project team environment.
2. List and define the various steps in bringing a biomedical product from concept to market.
3. Identify the realistic constraints of the team project.
4. Articulate the impacts of the project in a global, economic, environmental and societal context.
5. Design and conduct experiments to verify team projects requirements.
6. Use knowledge in mathematics, statistics, biological sciences, physical sciences, and engineering to solve the problems at the interface of engineering and biology whenever required.
7. Use the appropriate computer tools to design, model, simulate, and/or operate, the team projects.

8. Demonstrate oral communication skills in presenting team projects.

(https://canvas.eee.uci.edu/courses/11781/files?preview=4350718)

Overall Program Schedule

Quarter	Activities Performed	Track Expectations
Fall	focus on team formation, project definition and planning, addressing clinical need, FDA and technical documentation, initial experimentation on possible design solutions, decision on chosen design	*Industry Track:* develop research components of the project, UROP proposal *Entrepreneurial Track:* develop market study, first-draft business plan
Winter	**focus on the implementation of the chosen solution and redesign to a more detailed design with considerations of standards. Mid-course adjustment may be needed, depending on the findings**	***Industry Track:* continue research tasks as part of the project development *Entrepreneurial Track:* continue business plan as part of the project development**
Spring	pursue final testing, validation, and revision of the design solution followed by complete documentation	*Industry Track:* present at UROP engineering design competition *Entrepreneurial Track:* present at NVC business plan competition

Course Schedule

Week #	Date	Day	Lecture
1	1/10	Tue	Introduction to the Quarter: Deliverables and Expectations Lecturer: Prof. Khine **Lecture slides: Introduction** **(https://canvas.eee.uci.edu/courses/50931/files/21314046/download)**

1	1/12	Thu	Prototyping Lecturer: Ben Dolan
2	1/17	Tue	Finding Medical Device Product Market Fit: Customer Discovery Lecturer: David Cuccia **Lecture slides: Customer Discovery (https://canvas.eee.uci.edu/courses/50931/files/21314048/download)** **HW 1: SWOT Analysis and Team Science (https://canvas.eee.uci.edu/courses/50931/assignments/1070110)**
2	1/19	Thu	from Problem to Prototype to Product Lecturer: Kamran Ansari **Lecture slides (https://canvas.eee.uci.edu/courses/50931/files/21381428/download)**
3	1/24	Tue	Business Model Canvas Lecturer: Prof. Khine **Lecture slides: Business Model Canvas (https://canvas.eee.uci.edu/courses/50931/files/21314049/download)**
3	1/26	Thu	FMEA and Quality Control Lecturer: Dr. Chris Hoo **Lecture slides (https://canvas.eee.uci.edu/courses/50931/files/21381367/download)** **FMEA example (https://canvas.eee.uci.edu/courses/50931/files/21381370/download)** **FMEA blank sheet (https://canvas.eee.uci.edu/courses/50931/files/21381361/download)**
4	1/31	Tue	Team Check Ins (9am-1pm) at ISEB 6810 Design for Manufacturability

			Lecturers: Julian Drake and Maaikee Pronda **Lecture slides** **(https://canvas.eee.uci.edu/courses/50931/files/21381313/download)**
4	2/2	Thu	Design Considerations in Healthcare Lecturer: Amit Rushi
5	2/7	Tue	Team Check Ins (9am-1pm) at ISEB 6810 Design from Concept to Clinical Trial Lecturer: Joe Passman
5	2/9	Thu	The Entire Journey: from Personal Pain to Profitable Exit Lecturer: Surbhi Sarna
6	2/14	Tue	Designing for User's Needs and How to get a job Lecturer: Dr.Michelle Khine, Tai Le **Dr. Khine's lecture slides** **(https://canvas.eee.uci.edu/courses/50931/files/21562627/download)** **Tai's lecture slides** **(https://canvas.eee.uci.edu/courses/50931/files/21562618/download)**
6	2/16	Thu	Emotional Intelligence - What you Need to Close a Deal Lecturer: Mark Santora Book: **How to Win Friends and Influence People** **(https://www.amazon.com/How-Win-Friends-Influence-People/dp/0671027034)**
7	2/21	Tue	Innovating in a Large Company versus a Start-Up Lecturer: Dr. Samir Shriem **Lecture slides** **(https://canvas.eee.uci.edu/courses/50931/files/21652484/download)**

7	2/23	Thu	ABET Senior Feedback Session **HW 2: Initial Fabrication Design Review, Customer Interviews (https://canvas.eee.uci.edu/courses/50931/assignments/1070111)** **Lecture slides (https://canvas.eee.uci.edu/courses/50931/files/21685073/download)**
8	2/28	Tue	Lean Six Sigma and Agile Design Process Part II Lecturer: Dr. Chris Hoo **Lecture slides (https://canvas.eee.uci.edu/courses/50931/files/21739424/download)**
8	3/2	Thu	Industry Networking Night Location: Division of Continuing Education (DCE Building, Building 8) 510 East Peltason Drive, Irvine, CA 92697
9	3/7	Tue	**Project Presentations (https://canvas.eee.uci.edu/courses/50931/assignments/1070109)** (8 min presentation each team) **Due 3/6: Winter Design Review Poster due at 2pm to Dropbox Drive and Canvas Assignment - TENTATIVE, SUBJECT TO CHANGE! (https://canvas.eee.uci.edu/courses/50931/assignments/1070121)**
9	3/9	Thu	**Project Presentations (https://canvas.eee.uci.edu/courses/50931/assignments/1070109)** (8 min presentation each team) **HW 3: Qualification Test Procedure, New Venture Competition Concept Paper - Due 3/11 (https://canvas.eee.uci.edu/courses/50931/assignments/1070112)**

			***NVC Concept Paper due to competition website due by Sunday, March 12, 2023 at 11:59 AM (not PM!)*
10	3/14	Tue	**Project Presentations (https://canvas.eee.uci.edu/courses/50931/assignments/1070109)** (8 min presentation each team)
10	3/16	Thu	**Project Presentations (https://canvas.eee.uci.edu/courses/50931/assignments/1070109)** (8 min presentation each team) **HW 4: New Venture Competition Pitch Deck, First Generation Prototype (https://canvas.eee.uci.edu/courses/50931/assignments/1070113)**
10	3/17	Fri	**Winter Design Review - Poster Presentation (https://canvas.eee.uci.edu/courses/50931/assignments/1070121)** Location: Engineering Plaza (Location and Time CONFIRMED) Time: TBA
Final	3/20	Mon	**HW 5: Team Evaluations, Senior Survey (https://canvas.eee.uci.edu/courses/50931/assignments/1070114)**

Resources for Projects and Assignments

(https://canvas.eee.uci.edu/courses/50931/pages/resources)

Upcoming Workshops:

Job Opportunities:

Competitions:

ANSI Competitions (Standards):

https://www.ansi.org/news_publications/news_story?menuid=7&articleid=713eb799-ab8b-403b-9d36-2b53dc98109c&utm_campaign=OO_EML_20September-21-2020-whatsnew_BG&utm_medium=email&utm_source=whatsnew (https://www.ansi.org/news_publications/news_story?menuid=7&articleid=713eb799-ab8b-403b-9d36-2b53dc98109c&utm_campaign=OO_EML_20September-21-2020-whatsnew_BG&utm_medium=email&utm_source=whatsnew)

VentureWell Competitions and Resources

ASPIRE (https://venturewell.org/aspire/)
BMEidea (https://venturewell.org/bmeidea/)
Cleantech University Prize (https://venturewell.org/cleantech-university-prize-cleantech/)
DEBUT (https://venturewell.org/debut/)
E-Teams Grants (https://venturewell.org/student-grants/)
Inventing Green Toolkits (https://venturewell.org/inventing-green-toolkits/)
NSF I-Corps (https://venturewell.org/i-corps/)

Other Competitions and Resources

ACC InVenture Prize (http://accinventure.gatech.edu/)
Baylor New Venture Competition (https://www.baylor.edu/business/newventurecompetition/)
Collegiate Inventors Competition (http://www.invent.org/challenge/)
James Dyson Award (https://www.jamesdysonaward.org/)
MIT Clean Energy Prize (http://cep.mit.edu/)
MIT Water Innovation Prize (http://www.mitwaterinnovation.org/)
Rabobank-MIT Food and Agribusiness Innovation Prize (http://food-ag.squarespace.com/innovation-prize/)
Rice Business Plan Competition (https://rbpc.rice.edu/)
Westly Prize (https://westly.org/westly-prize/)
Pitch Launch Grow (https://www.universitylabpartners.org/our-events/pitch-launch-grow-2021)
https://ucinnovationchallenge.org/ (https://ucinnovationchallenge.org/)

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BioENGINE LinkedIn: https://www.linkedin.com/groups/13533228/ (https://www.linkedin.com/groups/13533228/)

BioENGINE Instagram: @bioengine

BME Discord Channel: https://discord.gg/y37NkV5f (https://discord.gg/y37NkV5f)