

# BME 180B BME Engineering Design

## Winter 2024

### 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.

### Instructional Team

#### Instructors

Prof. Tibor Juhasz, 3113 Natural Sciences II, [tjuhasz@hs.uci.edu](mailto:tjuhasz@hs.uci.edu) (<mailto:tjuhasz@hs.uci.edu>)

Prof. Christine King, 3410 Engineering Hall, [kingce@uci.edu](mailto:kingce@uci.edu) (<mailto:kingce@uci.edu>)

- Dr. King's Office/ET Fab Lab Hours: Mondays/Fridays 1pm-3pm, ET 436, or by appointment

#### Teaching Assistants

Jiaxin (Jason) Luo, [luoj34@uci.edu](mailto:luoj34@uci.edu) (<mailto:luoj34@uci.edu>)

<mailto:tail3@uci.edu> Sina Javadzadeh No, [javadzas@uci.edu](mailto:javadzas@uci.edu) (<mailto:javadzas@uci.edu>)

**Office Hours:** By appointment via E-mail

### Fabrication Lab Hours

Fabrication Lab Room Hours and Location:

Undergraduate Supervisor: Eli Pineda, [ejpineda@uci.edu](mailto:ejpineda@uci.edu) (<mailto:ejpineda@uci.edu>)

Location: Engineering Tower (ET) Room 436

Open Hours:

Mondays: 1-3pm

Tuesdays: by appointment

Wednesdays: closed

Thursdays: by appointment

Fridays: 1-3pm

Testing Lab + Meeting Room Hours and Location:

Multipurpose Science and Technology Building (MSTB) room 214

Open Hours: By Appointment, contact Dr. Christine King [kingce@uci.edu](mailto:kingce@uci.edu)  
(<mailto:kingce@uci.edu>) to schedule

## 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%, HW6: -1 one full letter grade if you don't submit it!)
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	<i>Industry Track:</i> develop research components of the project, UROP proposal <i>Entrepreneurial Track:</i> develop market study, first-draft business plan
Winter	<b>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</b>	<b><i>Industry Track:</i> continue research tasks as part of the project development</b> <b><i>Entrepreneurial Track:</i> continue business plan as part of the project development</b>
Spring	pursue final testing, validation, and revision of the design solution followed by complete documentation	<i>Industry Track:</i> present at UROP engineering design competition <i>Entrepreneurial Track:</i> present at NVC business plan competition

## Course Schedule

Week #	Date	Day	Lecture
1	1/9	Tue	<p>Introduction to the Quarter: <b><u>Deliverables and Expectations</u></b>  <a href="https://canvas.eee.uci.edu/courses/60217/files/25119791?wrap=1">           (https://canvas.eee.uci.edu/courses/60217/files/25119791?wrap=1)         </a>    <a href="https://canvas.eee.uci.edu/courses/60217/files/25119791/download?download_frd=1">           (https://canvas.eee.uci.edu/courses/60217/files/25119791/download?download_frd=1)         </a></p> <p>Lecturers: Dr. Christine King, Dr. Tibor Juhasz (lead)</p> <p><b><u>Accelerated Masters Program Announcement</u></b>  <a href="https://canvas.eee.uci.edu/courses/60217/files/25133056?wrap=1">           (https://canvas.eee.uci.edu/courses/60217/files/25133056?wrap=1)         </a>  </p>

			<a href="https://canvas.eee.uci.edu/courses/60217/files/25133056/download?download_frd=1">https://canvas.eee.uci.edu/courses/60217/files/25133056/download?download_frd=1</a> , Maggie Mulcare
1	1/11	Thu	<p><b><u>Crash Course in Prototyping</u></b>  <a href="https://canvas.eee.uci.edu/courses/60217/files/25137579?wrap=1">https://canvas.eee.uci.edu/courses/60217/files/25137579?wrap=1</a>    <a href="https://canvas.eee.uci.edu/courses/60217/files/25137579/download?download_frd=1">https://canvas.eee.uci.edu/courses/60217/files/25137579/download?download_frd=1</a></p> <p>Lecturer: Christine King</p>
2	1/16	Tue	<p>Design in Manufacturing  Lecturer: Hadi Srass, ViaLase Inc.</p> <p><b><u>HW 1: SWOT Analysis and Team Science</u></b>  <a href="https://canvas.eee.uci.edu/courses/60217/assignments/1276292">https://canvas.eee.uci.edu/courses/60217/assignments/1276292</a></p>
2	1/18	Thu	<p>From Prototype to Product  Lecturer: Tibor Juhasz</p>
3	1/23	Tue	<p><b><u>Quality Control and Measurement Systems</u></b>  <a href="https://canvas.eee.uci.edu/courses/60217/files/25266196?wrap=1">https://canvas.eee.uci.edu/courses/60217/files/25266196?wrap=1</a>    <a href="https://canvas.eee.uci.edu/courses/60217/files/25266196/download?download_frd=1">https://canvas.eee.uci.edu/courses/60217/files/25266196/download?download_frd=1</a></p> <p>Lecturer: Jasen Nava-Massey, NM Engineering LLC.</p>
3	1/25	Thu	<p><b><u>FMEA and Quality Control</u></b>  <a href="https://canvas.eee.uci.edu/courses/60217/files/25374562?wrap=1">https://canvas.eee.uci.edu/courses/60217/files/25374562?wrap=1</a>    <a href="https://canvas.eee.uci.edu/courses/60217/files/25374562/download?download_frd=1">https://canvas.eee.uci.edu/courses/60217/files/25374562/download?download_frd=1</a></p> <p><b><u>FMEA Example-1.xlsx</u></b>  <a href="https://canvas.eee.uci.edu/courses/60217/files/25374565?wrap=1">https://canvas.eee.uci.edu/courses/60217/files/25374565?wrap=1</a>    <a href="https://canvas.eee.uci.edu/courses/60217/files/25374565/download?download_frd=1">https://canvas.eee.uci.edu/courses/60217/files/25374565/download?download_frd=1</a></p>

			Lecturer: Chris Hoo, Fluxergy
4	1/30	Tue	<b><u>Team Check Ins (5-6 groups, 15 min per group)</u></b>  ( <a href="https://www.signupgenius.com/go/805044FAAAD2BA5FA7-47181930-bme180b">https://www.signupgenius.com/go/805044FAAAD2BA5FA7-47181930-bme180b</a> )
4	2/1	Thu	<b><u>Team Check Ins (5-6 groups, 15 min per group)</u></b>  ( <a href="https://www.signupgenius.com/go/805044FAAAD2BA5FA7-47181930-bme180b">https://www.signupgenius.com/go/805044FAAAD2BA5FA7-47181930-bme180b</a> )
5	2/6	Tue	<b><u>Customer Interviews and Business Model Canvas</u></b> ( <a href="https://canvas.eee.uci.edu/courses/60217/files/25453806?wrap=1">https://canvas.eee.uci.edu/courses/60217/files/25453806?wrap=1</a> )  ( <a href="https://canvas.eee.uci.edu/courses/60217/files/25453806/download?download_frd=1">https://canvas.eee.uci.edu/courses/60217/files/25453806/download?download_frd=1</a> )  Lecturer: David Ochi, School of Business
5	2/8	Thu	<b><u>Team Check Ins (5-6 groups, 15 min per group)</u></b>  ( <a href="https://www.signupgenius.com/go/805044FAAAD2BA5FA7-47181930-bme180b">https://www.signupgenius.com/go/805044FAAAD2BA5FA7-47181930-bme180b</a> )
6	2/13	Tue	Senior Feedback Session Lecturer: Dr. Bernard Choi, Dr. Elliot Botvinick
6	2/15	Thu	How the Senior Design Projects Impacted my Future Panel Discussion Lecturers: UCI Alumni  <b><u>HW 2: Customer Interviews, Initial Fabrication Design Review</u></b> ( <a href="https://canvas.eee.uci.edu/courses/60217/assignments/1276293">https://canvas.eee.uci.edu/courses/60217/assignments/1276293</a> )
7	2/20	Tue	<b><u>Team Check Ins Round 2 (5-6 groups, 15 min per group)</u></b>  ( <a href="https://www.signupgenius.com/go/805044FAAAD2BA5FA7-47961717-bme180b">https://www.signupgenius.com/go/805044FAAAD2BA5FA7-47961717-bme180b</a> )

7	2/22	Thu	<p><b><u>Team Check Ins Round 2 (5-6 groups, 15 min per group)</u></b> </p> <p>(<a href="https://www.signupgenius.com/go/805044FAAAD2BA5FA7-47961717-bme180b">https://www.signupgenius.com/go/805044FAAAD2BA5FA7-47961717-bme180b</a>)</p>
8	2/27	Tue	<p><b><u>Team Check Ins Round 2 (5-6 groups, 15 min per group)</u></b> </p> <p>(<a href="https://www.signupgenius.com/go/805044FAAAD2BA5FA7-47961717-bme180b">https://www.signupgenius.com/go/805044FAAAD2BA5FA7-47961717-bme180b</a>)</p>
8	2/29	Thu	<p><b><u>Industry Night</u></b></p> <p>(<a href="https://canvas.eee.uci.edu/courses/60217/files/25542089?wrap=1">https://canvas.eee.uci.edu/courses/60217/files/25542089?wrap=1</a>)</p> <p></p> <p>(<a href="https://canvas.eee.uci.edu/courses/60217/files/25542089/download?download_frd=1">https://canvas.eee.uci.edu/courses/60217/files/25542089/download?download_frd=1</a>)</p> <p>Location: Division of Continuing Education (DCE)</p> <p><i>Due 2/28 AT 2PM (check announcements for more details and date updates): <a href="https://canvas.eee.uci.edu/courses/60217/assignments/1276326">Winter Design Review Poster</a></i></p> <p>(<a href="https://canvas.eee.uci.edu/courses/60217/assignments/1276326">https://canvas.eee.uci.edu/courses/60217/assignments/1276326</a>) via Canvas Assignment</p>
9	3/5	Tue	<p><b><u>Ethics in Medical Device Design</u></b></p> <p>(<a href="https://canvas.eee.uci.edu/courses/60217/files/25823390?wrap=1">https://canvas.eee.uci.edu/courses/60217/files/25823390?wrap=1</a>)</p> <p></p> <p>(<a href="https://canvas.eee.uci.edu/courses/60217/files/25823390/download?download_frd=1">https://canvas.eee.uci.edu/courses/60217/files/25823390/download?download_frd=1</a>)</p> <p>Lecturer: Nadine Alfari, CHOC</p>
9	3/7	Thu	<p><b><u>Project Presentations</u></b></p> <p>(<a href="https://canvas.eee.uci.edu/courses/60217/assignments/1276290">https://canvas.eee.uci.edu/courses/60217/assignments/1276290</a>) (8 min presentation each team)</p> <p><b><u>Presentation Schedule</u></b></p> <p>(<a href="https://canvas.eee.uci.edu/courses/60217/files/25812114?wrap=1">https://canvas.eee.uci.edu/courses/60217/files/25812114?wrap=1</a>)</p> <p></p> <p>(<a href="https://canvas.eee.uci.edu/courses/60217/files/25812114/download?download_frd=1">https://canvas.eee.uci.edu/courses/60217/files/25812114/download?download_frd=1</a>)</p>

			<p><b><u><a href="https://canvas.eee.uci.edu/courses/60217/assignments/1276294">HW 3: Qualification Test Procedure, NVC Concept Paper</a></u></b>  <b><u>(<a href="https://canvas.eee.uci.edu/courses/60217/assignments/1276294">https://canvas.eee.uci.edu/courses/60217/assignments/1276294</a>)</u></b>  <b><i>DUE MARCH 10 TO NVC SITE</i></b></p>
10	3/12	Tue	<p><b><u><a href="https://canvas.eee.uci.edu/courses/60217/assignments/1276290">Project Presentations</a></u></b>  <b><u>(<a href="https://canvas.eee.uci.edu/courses/60217/assignments/1276290">https://canvas.eee.uci.edu/courses/60217/assignments/1276290</a>)</u></b> (8 min presentation each team)</p>
10	3/14	Thu	<p><b><u><a href="https://canvas.eee.uci.edu/courses/60217/assignments/1276290">Project Presentations</a></u></b>  <b><u>(<a href="https://canvas.eee.uci.edu/courses/60217/assignments/1276290">https://canvas.eee.uci.edu/courses/60217/assignments/1276290</a>)</u></b> (8 min presentation each team)</p>
10	3/15	Fri	<p>1pm-4pm: Winter Design Review – Poster Exhibition  Location: Student Center Pacific Ballroom</p> <p><b><u><a href="https://canvas.eee.uci.edu/courses/60217/assignments/1276295">HW 4: New Venture Competition Pitch Deck, First Generation Prototype</a></u></b>  <b><u>(<a href="https://canvas.eee.uci.edu/courses/60217/assignments/1276295">https://canvas.eee.uci.edu/courses/60217/assignments/1276295</a>)</u></b></p>
Final	3/18	Mon	<p><b><u><a href="https://canvas.eee.uci.edu/courses/60217/assignments/1276296">HW 5: Senior Survey</a></u></b>  <b><u>(<a href="https://canvas.eee.uci.edu/courses/60217/assignments/1276296">https://canvas.eee.uci.edu/courses/60217/assignments/1276296</a>)</u></b></p> <p><b><u><a href="https://canvas.eee.uci.edu/courses/60217/assignments/1276319">Team Peer Evaluations</a></u></b>  <b><u>(<a href="https://canvas.eee.uci.edu/courses/60217/assignments/1276319">https://canvas.eee.uci.edu/courses/60217/assignments/1276319</a>)</u></b></p> <p><b><u><a href="https://canvas.eee.uci.edu/courses/60217/assignments/1289826">HW 6: Budget + PDFs of Receipts</a></u></b>  <b><u>(<a href="https://canvas.eee.uci.edu/courses/60217/assignments/1289826">https://canvas.eee.uci.edu/courses/60217/assignments/1289826</a>)</u></b></p>

## **[Resources for Projects and Assignments](https://canvas.eee.uci.edu/courses/60217/pages/resources)**

**(<https://canvas.eee.uci.edu/courses/60217/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) ↗  
([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/) ↗ (<https://venturewell.org/aspire/>)

[BMEidea](https://venturewell.org/bmeidea/) ↗ (<https://venturewell.org/bmeidea/>)

[Cleantech University Prize](https://venturewell.org/cleantech-university-prize-cleantech/) ↗ (<https://venturewell.org/cleantech-university-prize-cleantech/>)

[DEBUT](https://venturewell.org/debut/) ↗ (<https://venturewell.org/debut/>)

[E-Teams Grants](https://venturewell.org/student-grants/) ↗ (<https://venturewell.org/student-grants/>)

[Inventing Green Toolkits](https://venturewell.org/inventing-green-toolkits/) ↗ (<https://venturewell.org/inventing-green-toolkits/>)

[NSF I-Corps](https://venturewell.org/i-corps/) ↗ (<https://venturewell.org/i-corps/>)

### Other Competitions and Resources

[ACC InVenture Prize](http://accinventure.gatech.edu/) ↗ (<http://accinventure.gatech.edu/>)

[Baylor New Venture Competition](https://www.baylor.edu/business/newventurecompetition/) ↗ (<https://www.baylor.edu/business/newventurecompetition/>)

[Collegiate Inventors Competition](http://www.invent.org/challenge/) ↗ (<http://www.invent.org/challenge/>)

[James Dyson Award](https://www.jamesdysonaward.org/) ↗ (<https://www.jamesdysonaward.org/>)

[MIT Clean Energy Prize](http://cep.mit.edu/) ↗ (<http://cep.mit.edu/>)

[MIT Water Innovation Prize](http://www.mitwaterinnovation.org/) ↗ (<http://www.mitwaterinnovation.org/>)

[Rabobank-MIT Food and Agribusiness Innovation Prize](http://food-ag.squarespace.com/innovation-prize/) ↗ (<http://food-ag.squarespace.com/innovation-prize/>)

[Rice Business Plan Competition](https://rbpc.rice.edu/) ↗ (<https://rbpc.rice.edu/>)

[Westly Prize](https://westly.org/westly-prize/) ↗ (<https://westly.org/westly-prize/>)

[Pitch Launch Grow](https://www.universitylabpartners.org/our-events/pitch-launch-grow-2021) ↗ (<https://www.universitylabpartners.org/our-events/pitch-launch-grow-2021>)

<https://ucinnovationchallenge.org/> ↗ (<https://ucinnovationchallenge.org/>)

## Join Us on Social Media!

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>)