

BME 180C BME Engineering Design

Spring 2024

Course Descriptions

BME 180C – 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, marketing, and FDA product approval. Materials fee.

BME 180C Instructors

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

Dr. Juhasz Office Hours: By Appointment

Prof. Christine King, 436 Engineering Tower, kingce@uci.edu (<mailto:kingce@uci.edu>)
(<mailto:kingce@uci.edu>) Dr. King's Office Hours: Tuesdays and Thursdays 1pm-5:20pm in
BME Fab Lab, ET 436

Teaching Assistants

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

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

Office Hours: By appointment via E-mail

Professor King Office Hours and Fabrication Lab

Fabrication Lab Room Hours and Location:

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

Location: Engineering Tower (ET) Room 436

Open Lab Times:

Tuesday 1pm-5:20pm

Thursday 1pm-5:20pm

Electrophysiology Testing Lab Location: Multipurpose Science and Technology (MSTB)
Room 214

Open Lab Times: By Appointment Only

Lectures

Tuesdays, Thursdays 5:30PM to 6:50PM

Location: Rowland Hall Room 101

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

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|---|-----|
| <p style="text-align: right;">Website (https://canvas.eee.uci.edu/courses/63269/assignments/1354914)</p> | 10% |
| <p style="text-align: right;">Final Presentation (UROP or NVC) (https://canvas.eee.uci.edu/courses/63269/assignments/1354909)</p> | 20% |
| <p style="text-align: right;">Spring Poster (https://canvas.eee.uci.edu/courses/63269/assignments/1354908)</p> | 10% |

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| <p style="text-align: right;"><u>Final Report</u> (https://canvas.eee.uci.edu/courses/63269/assignments/1354910) :</p> <p style="text-align: center;">**Final Spring Purchase Receipts (https://canvas.eee.uci.edu/courses/63269/assignments/1360612) (**-1 whole letter grade if not submitted)</p> | 35% |
| <p style="text-align: right;"><u>Peer Evaluation</u> (https://canvas.eee.uci.edu/courses/63269/assignments/1354913) :</p> | 5% |
| <p style="text-align: right;"><u>Attendance</u> (https://canvas.eee.uci.edu/courses/63269/assignments/1354907) :</p> | 20% |
| <p style="text-align: right;"><u>Bonus Course Survey</u> (https://canvas.eee.uci.edu/courses/63269/assignments/1354912) :</p> | 2% |
| TOTAL: | 102% |

Course Learning Outcomes

BME 180A-B-C – 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. Identify and assess challenges in each of the steps.
5. Articulate the impacts of the project in a global, economic, environmental and societal context.
6. Design and conduct experiments to verify team projects requirements.
7. Use knowledge in mathematics, statistics, biological sciences, physical sciences, and engineering to solve the problems at the interface of engineering and biology whenever required.
8. Use the appropriate computer tools to design, model, simulate, and/or operate, the team projects.

9. Apply engineering principles and practices to meet the challenges.
10. Demonstrate oral communication skills in presenting team projects.
11. Establish initial contacts with major local BME companies.
12. Demonstrate knowledge of contemporary issues related to biomedical engineering.





Overall Program Schedule

| Quarter | Activities Performed | Track Expectations |
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| 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 | 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 | <i>Industry Track:</i> continue research tasks as part of the project development <i>Entrepreneurial Track:</i> continue business plan as part of the project development |
| 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


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

| Week # | Date | Day | Lecture |
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| 1 | 4/2 | Tue | Lecture: Dr. Christine King, Dr. Tibor Juhasz Introduction to the Quarter: Deliverables and Expectations |
| 1 | 4/4 | Thu | Lecture: Dr. Christine King Website Authoring (https://canvas.eee.uci.edu/courses/63269/files/26207137?wrap=1) ↓ (https://canvas.eee.uci.edu/courses/63269/files/26207137/download?download_frd=1) |
| 2 | 4/9 | Tue | Team Assessments #1  (https://www.signupgenius.com/go/805044FAAAD2BA5FA7-48776779-bme180c) <i>Due April 10: UROP Registration and Abstract</i> (https://canvas.eee.uci.edu/courses/63269/assignments/1354909) – <i>Choose “Poster Presentation”, Industry Track</i> |
| 2 | 4/11 | Thu | Team Assessments #1  (https://www.signupgenius.com/go/805044FAAAD2BA5FA7-48776779-bme180c) |
| 3 | 4/16 | Tue | Team Assessments #1  (https://www.signupgenius.com/go/805044FAAAD2BA5FA7-48776779-bme180c) |
| 3 | 4/18 | Thu | Team Assessments #1  (https://www.signupgenius.com/go/805044FAAAD2BA5FA7-48776779-bme180c) <i>Beall Competition Midpoint Oral Presentations April 19, Entrepreneurial Track (based on which competition you applied to)</i> |
| 4 | 4/23 | Tue | Guest Lecture: Eugene Spiritus, Health Innovation Ventures |

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| | | | Medical Innovations in Entrepreneurism |
| 4 | 4/25 | Thu | Guest Lecture: Tim Rumbaugh, Edwards Lifesciences Project Management in Industry |
| 5 | 4/30 | Tue | Guest Lecture: Hamid Rafi, Inari Medical Medical Innovations in Industry |
| 5 | 5/2 | Thu | Team Assessments #2 – 2 min Pitch and Demo Practice Each Team get 2 MINUTES only to give a pitch (no slides) then a 2 minute video or physical demo We will be going by <i>team number</i> <i><u>Due May 6: UROP Presenter Profile and Poster</u></i> <i><u>(https://canvas.eee.uci.edu/courses/63269/assignments/1354909)</u></i> , <i>Industry Track</i> |
| 6 | 5/7 | Tue | Team Assessments #2 – 2 min Pitch and Demo Practice Each Team get 2 MINUTES only to give a pitch (no slides) then a 2 minute video or physical demo We will be going by <i>team number</i> |
| 6 | 5/9 | Thu | Team Assessments #2 – 2 min Pitch and Demo Practice Each Team get 2 MINUTES only to give a pitch (no slides) then a 2 minute video or physical demo We will be going by <i>team number</i> |
| 6 | 5/10 | Fri | <i><u>New Venture Competition Semi-Finals Presentations</u></i> <i><u>(https://canvas.eee.uci.edu/courses/63269/assignments/1354909)</u></i> <i>May 10</i> <i><u>Beall Competition Business Case Submission</u></i> <i><u>(https://canvas.eee.uci.edu/courses/63269/assignments/1354909)</u></i> <i>Due May 13</i> |

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| | | | --Based on which competition you applied to |
| 7 | 5/14 | Tue | <p>Team Assessments #2 – 2 min Pitch and Demo Practice</p> <p>Each Team get 2 MINUTES only to give a pitch (no slides) then a 2 minute video or physical demo</p> <p>We will be going by <i>team number</i></p> |
| 7 | 5/16 | Thu | <p>Lecture: Dr. Christine King</p> <p>Global Considerations in Design</p> <p><u>Team Webpages Live</u> (https://canvas.eee.uci.edu/courses/63269/assignments/1354914) at 5pm, Both Tracks</p> |
| 7 | 5/17 | Friday | <p><u>UROP Symposium</u> (https://canvas.eee.uci.edu/courses/63269/assignments/1354909) May 17 – Poster Presentation, Industry Track</p> |
| 8 | 5/21 | Tue | <p><u>Team Assessments #3</u>  (https://www.signupgenius.com/go/805044FAAAD2BA5FA7-48777543-bme180c)</p> <p><u>Beall Competition Presentations</u> (https://canvas.eee.uci.edu/courses/63269/assignments/1354909) May 21 2-5pm, Entrepreneurial Track</p> |
| 8 | 5/23 | Thu | <p><u>Team Assessments #3</u>  (https://www.signupgenius.com/go/805044FAAAD2BA5FA7-48777543-bme180c)</p> <p><i>NVC Grand Finale + Awards for Finalists Only</i></p> |
| 9 | 5/28 | Tue | <p><u>Team Assessments #3</u>  (https://www.signupgenius.com/go/805044FAAAD2BA5FA7-48777543-bme180c)</p> |

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| 9 | 5/30 | Thu | <p><u>Team Assessments #3</u> </p> <p><u>(https://www.signupgenius.com/go/805044FAAAD2BA5FA7-48777543-bme180c)</u></p> <p><u>Final Symposium Poster</u> <u>(https://canvas.eee.uci.edu/courses/63269/assignments/1354908)</u> <i>due 2pm for Printing, Both Tracks</i></p> |
| 10 | 6/4 | Tue | <p>CLASS CANCELED –prepare project demos and pitches</p> <p><u>EEE Evaluations (sent via email from school)</u> <u>(https://canvas.eee.uci.edu/courses/63269/assignments/1354912)</u></p> |
| 10 | 6/6 | Thu | <p>4 – 7pm: <i>Final Symposium and Awards Ceremony at the Cove</i></p> <p>Judges and Keynote To Be Announced</p> |
| Final | 6/13 | Thu | <p><u>Final Report,</u> <u>(https://canvas.eee.uci.edu/courses/63269/assignments/1354910)</u> <u>Team Evaluations</u> <u>(https://canvas.eee.uci.edu/courses/63269/assignments/1354913)</u>, and <u>Purchase Receipts</u> <u>(https://canvas.eee.uci.edu/courses/63269/assignments/1360612)</u> <i>due at 11:59pm to Canvas Assignment, Both Tracks</i></p> |

[Resources for Fabrication and Assignments](https://canvas.eee.uci.edu/courses/63269/pages/resources)

[\(<https://canvas.eee.uci.edu/courses/63269/pages/resources>\)](https://canvas.eee.uci.edu/courses/63269/pages/resources)

Projects Expectations

[BME180-CBEMS189 Senior Design Roles and Expectations.pdf](https://canvas.eee.uci.edu/courses/20058/files/7209758/download?wrap=1)

[\(<https://canvas.eee.uci.edu/courses/20058/files/7209758/download?wrap=1>\)](https://canvas.eee.uci.edu/courses/20058/files/7209758/download?wrap=1) 

[\(\[https://canvas.eee.uci.edu/courses/20058/files/7209758/download?download_frd=1\]\(https://canvas.eee.uci.edu/courses/20058/files/7209758/download?download_frd=1\)\)](https://canvas.eee.uci.edu/courses/20058/files/7209758/download?download_frd=1)

Project Team Assignment

<https://canvas.eee.uci.edu/courses/20058/files/7328528/download?wrap=1>

[Project and Team List \(https://canvas.eee.uci.edu/courses/63269/files/26204021?wrap=1\)](https://canvas.eee.uci.edu/courses/63269/files/26204021?wrap=1) ↓
https://canvas.eee.uci.edu/courses/63269/files/26204021/download?download_frd=1

Optional Business Competitions

James Dyson Award

James Dyson is on the hunt for bright minds with fresh ideas across the globe. If you have an invention that solves a problem, we want to hear about it.

The James Dyson Award is an international design award that celebrates, encourages and inspires the next generation of design engineers. It's open to current and recent design engineering students, and is run by the James Dyson Foundation, James Dyson's charitable trust, as part of its mission to get young people excited about design engineering.

In this session you'll hear first-hand about the James Dyson Award, how to enter, what makes a good entry and what's in it for you. Your idea could win \$40,000.

- Overview of Dyson's design process
- Tips for what makes a winning entry
- Meet Judit Giró Benet, UCI MECPS alumna, Winner of the 2020 James Dyson International Award for her invention, The Blue Box
- Q+A with a Dyson engineer

<http://www.jamesdysonaward.org> ↗ (<http://www.jamesdysonaward.org/>)

Video - 2020 International Winner - The Blue Box:

<https://www.youtube.com/watch?v=PDyE0bWdrow> ↗ (<https://www.youtube.com/watch?v=PDyE0bWdrow>)




<https://www.youtube.com/watch?v=PDyE0bWdrow>


Article - James Dyson Award 2020 Global winners announced:

<https://www.dyson.com/newsroom/overview/features/november-2020/james-dyson-award-winners-2020>  (<https://www.dyson.com/newsroom/overview/features/november-2020/james-dyson-award-winners-2020>).


You can also find more information at:

[https://urldefense.com/v3/__http://www.jamesdysonaward.org_!!CzAuKJ42GuquVTTmVmPViYEvSg!LJgufqMZW5oKhyOIBSfehFovS2yQozj2f-TZ-_EoIQBWL-CR-4tEParCqS_-vHfY6uJoOqzGNkLg7MMqluiq5X00\\$](https://urldefense.com/v3/__http://www.jamesdysonaward.org_!!CzAuKJ42GuquVTTmVmPViYEvSg!LJgufqMZW5oKhyOIBSfehFovS2yQozj2f-TZ-_EoIQBWL-CR-4tEParCqS_-vHfY6uJoOqzGNkLg7MMqluiq5X00$) 

([https://urldefense.com/v3/__http://www.jamesdysonaward.org_!!CzAuKJ42GuquVTTmVmPViYEvSg!LJgufqMZW5oKhyOIBSfehFovS2yQozj2f-TZ-_EoIQBWL-CR-4tEParCqS_-vHfY6uJoOqzGNkLg7MMqluiq5X00\\$](https://urldefense.com/v3/__http://www.jamesdysonaward.org_!!CzAuKJ42GuquVTTmVmPViYEvSg!LJgufqMZW5oKhyOIBSfehFovS2yQozj2f-TZ-_EoIQBWL-CR-4tEParCqS_-vHfY6uJoOqzGNkLg7MMqluiq5X00$))

BlueBox entry into the award and other past winner's entries: 

([https://urldefense.com/v3/__https://www.jamesdysonaward.org/en-us/past-winners/_!!CzAuKJ42GuquVTTmVmPViYEvSg!LJgufqMZW5oKhyOIBSfehFovS2yQozj2f-TZ-_EoIQBWL-CR-4tEParCqS_-vHfY6uJoOqzGNkLg7MMqlsCYvyt5\\$](https://urldefense.com/v3/__https://www.jamesdysonaward.org/en-us/past-winners/_!!CzAuKJ42GuquVTTmVmPViYEvSg!LJgufqMZW5oKhyOIBSfehFovS2yQozj2f-TZ-_EoIQBWL-CR-4tEParCqS_-vHfY6uJoOqzGNkLg7MMqlsCYvyt5$))

[https://urldefense.com/v3/__https://www.jamesdysonaward.org/en-us/past-winners/_!!CzAuKJ42GuquVTTmVmPViYEvSg!LJgufqMZW5oKhyOIBSfehFovS2yQozj2f-TZ-_EoIQBWL-CR-4tEParCqS_-vHfY6uJoOqzGNkLg7MMqlsCYvyt5\\$](https://urldefense.com/v3/__https://www.jamesdysonaward.org/en-us/past-winners/_!!CzAuKJ42GuquVTTmVmPViYEvSg!LJgufqMZW5oKhyOIBSfehFovS2yQozj2f-TZ-_EoIQBWL-CR-4tEParCqS_-vHfY6uJoOqzGNkLg7MMqlsCYvyt5$) 

([https://urldefense.com/v3/__https://www.jamesdysonaward.org/en-us/past-winners/_!!CzAuKJ42GuquVTTmVmPViYEvSg!LJgufqMZW5oKhyOIBSfehFovS2yQozj2f-TZ-_EoIQBWL-CR-4tEParCqS_-vHfY6uJoOqzGNkLg7MMqlsCYvyt5\\$](https://urldefense.com/v3/__https://www.jamesdysonaward.org/en-us/past-winners/_!!CzAuKJ42GuquVTTmVmPViYEvSg!LJgufqMZW5oKhyOIBSfehFovS2yQozj2f-TZ-_EoIQBWL-CR-4tEParCqS_-vHfY6uJoOqzGNkLg7MMqlsCYvyt5$)).

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://canvas.eee.uci.edu/courses/11781/files?preview=4350718>

Job Opportunities

Announced via Canvas Announcements

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> 