ILLINOIS
Bioengineering
GRAINGER COLLEGE OF ENGINEERING

BIOE 400: Bioengineering Senior Design

Course Term and Year: Spring 2025
Course Duration: Full semester
Meeting time: Tuesdays, Thursdays 8:00 – 9:20 AM
Biweekly meetings with teaching staff will be assigned once groups and projects are assigned.
Course Format: In-person
Course Location: 1302 Everitt Laboratory
Weekly Hours of Expected Student Work, apart from instruction time: Students are expected to spend 10–12 hours outside of class per week.
Credit hours: 4
Semesters offered: Fall and Spring

Instructor Information

Holly Golecki, PhD
Department of BIOEngineering
University of Illinois at Urbana-Champaign
3134 Everitt Laboratory, 1406 Green St. Urbana, IL 61801
Office phone number: (217) 333-0085
Email: golecki@illinois.edu
Office Hours and Location: Tuesdays 11am-12pm in 3134 Everitt or by appointment

Teaching Assistant Information

TA Names and Contact Info:
Sandra Edward (sandrae@illinois.edu)
Nancy Pham (nancyyp2@illinois.edu)
Will Han (xueerh2@illinois.edu)
TA office hour time: TBD and by appointment
TA office hour location: 1229 Everitt, Senior Design Lab

Course Learning Objectives

Upon completion of this course, students should be able to:

1. Identify, formulate, and **analyze** complex engineering problems by applying principles of engineering.
2. **Apply** engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3. **Create** documentation and presentations to communicate effectively with a range of audiences.
4. **Apply** ethical and professional responsibilities in engineering and make informed judgments, with regard for global, economic, environmental, and social contexts.
5. Function effectively on a team whose members together provide leadership, **create** a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6. **Create and apply** appropriate. experimentation, analysis and interpretation of data using engineering judgment to draw conclusions.
7. **Understand and apply** new knowledge as needed, using appropriate learning strategies.

Absence Policies

- General**:** Your attendance at all scheduled classes (lecture and team meetings) is mandatory and essential for success in the course. However, circumstances occasionally occur where you may need to miss a class.
- Planned Absences**:** If you need to miss class for a religious observance, UIUC athletic commitment, interview or some other legitimate reason, you must make arrangements to make up the missed work a minimum of one week before the absence occurs, otherwise, the absence will be unexcused and you will

receive a zero for attendance. Assignments must be turned in early (before the deadline) if you will be absent on the day it is due.

- Serious Illness/Family Emergency**:** If you are seriously ill or experiencing a family emergency and are unable to attend a lecture or a team meeting, inform Dr. Golecki via email. If you need an extension on an assignment due to a serious illness or family emergency, arrangements must be made with Dr. Golecki BEFORE the assignment due date.

Prerequisites: BIOE 302 (Modeling Human Physiology), BIOE 303 (Quantitative Physiology Lab), BIOE 414 (Biomedical Instrumentation), BIOE 415 (Biomedical Instrumentation Lab)

Course Description

This capstone design course is the culmination of the Bioengineering curriculum. Students will perform market researchand explore entrepreneurship in the field of bioengineering resulting in the design of a device or process. Students will practice problem identification and the analysis of solutions for real-world problems from the perspective of value added for end-users. Students will use principles of design, engineering analysis, and customer discovery. This course emphasizes effective teamwork and technical communication, and integrates content related to intellectual property, United States Food and Drug Administration Quality System Regulation and Design Controls, human-centered design, FDA regulation, professionalism, and ethics. The overall goal of the course is to prepare students for careers in bioengineering.

Learning Management System

This course uses the Learning Management System Canvas: https://canvas.illinois.edu/

Textbook and Reading Materials

There is no required textbook. Two texts are on reserve at the library as complimentary reading:

- Herr, G. L. (2010). Biodesign: the process of innovating medical technologies. *Biomedical Instrumentation & Technology*, *44*(5), 388-388.
- King, P. H., & Fries, R. C. (2008). *Design of Biomedical Devices and Systems Second edition*. Crc Press.

Required Equipment

Required equipment will be available to students via the senior design lab, room 1229 Everitt lab. Project specific purchases should be ordered through capstone sponsors. No additional purchases are required.

Required Software

Assignments may be completed in Word, which can be accessed via Microsoft Office:
https://webstore.illinois.edu/shop/product.aspx?zpid=2816

Late Assignment Policy

Late assignments will incur a 10% penalty per day. After 7 days it is at the discretion of the instructor to accept late work or not. Exceptions to this policy will only be made if a student communicates with the instructor at least 24 hours in advance of the original assignment due date.

Assignments and Semester Schedule

All lectures, assignments, due dates, instructions, rubrics can be found on the **Canvas website**.

Grading Breakdown

60% Projects & Deliverables
20% Participation
20% Client/Peer Assessment

Final Letter Grades The overall course grade is given on an absolute scale and will not be curved. Concerns about individual assignments or grades should be expressed to the instructor promptly. This course will be assigning +/– letter grades.

- A+ > 97% > A > 93% > A–
- B+ > 87% > B > 83% > B–
- C+ > 77% > C > 73% > C–

- D+ > 67% > D > 63% > D–
- F < 60%

University, College and Course Policies and Practices

Academic Integrity The University of Illinois at Urbana-Champaign Student Code should also be considered as a part of this syllabus. Students should pay particular attention to Article 1, Part 4: Academic Integrity. Read the Code at the following URL: http://studentcode.illinois.edu/.

Academic dishonesty may result in a failing grade. Every student is expected to review and abide by the Academic Integrity Policy: https://studentcode.illinois.edu/article1/part4/1-401/. Ignorance is not an excuse for any academic dishonesty. It is your responsibility to read this policy to avoid any misunderstanding. Do not hesitate to ask the instructor(s) if you are ever in doubt about what constitutes plagiarism, cheating, or any other breach of academic integrity.

Use of Generative AI Technology Generative AI, such as ChatGPT, Bard, and Microsoft Copilot/Bing Chat, can answer questions and generate text, images, and other media. The appropriate use of generative AI varies from course to course. In BIOE400, there are times when generative AI may be useful in the course. If you choose to use generative AI as permitted below, **you must document, attribute, and cite all AI contributions to your coursework and take full responsibility for the contributions including the accuracy of the information and reliability of sources**. When using generative AI, keep a group Canvas page documenting prompts, AI responses, and your usage. Your instructor may ask you to provide this documentation.

You may use generative AI in BIOE400 for the following:

1. Revising your own text for spelling and grammar
2. Conducting basic research on the course and assignment topics

You MAY NOT use generative AI in BIOE400 for the following:

1. Generating data for experiments conducted in the course
2. Writing entire sentences, paragraphs, or papers to complete class assignments
4. Solving technical design problems, such as calculating theoretical system responses.

If you have a question about the use of Generative AI, please reach out to your instructors. Failure to abide by these guidelines is a violation of academic integrity. We will investigate suspected uses of generative AI that do not follow these guidelines and apply sanctions as outlined in the Illinois Student Code.

Family Education Rights and Privacy Act (FERPA) Any student who has suppressed their directory information pursuant to Family Educational Rights and Privacy Act (FERPA) should self-identify to the instructor to ensure protection of the privacy of their attendance in this course. See http://registrar.illinois.edu/ferpa for more information on FERPA.

Mental Health Significant stress, mood changes, excessive worry, substance/alcohol misuse or interferences in eating or sleep can have an impact on academic performance, social development, and emotional wellbeing. The University of Illinois offers a variety of confidential services including individual and group counseling, crisis intervention, psychiatric services, and specialized screenings which are covered through the Student Health Fee. If you or someone you know experiences any of the above mental health concerns, it is strongly encouraged to contact or visit any of the University's resources provided below. Getting help is a smart and courageous thing to do for yourself and for those who care about you.

- Counseling Center (217) 333-3704
- McKinley Health Center (217) 333-2700
- National Suicide Prevention Lifeline (800) 273-8255
- Rosecrance Crisis Line (217) 359-4141 (available 24/7, 365 days a year)

If you are in immediate danger, call 911.

*This statement is approved by the University of Illinois Counseling Center

Community of Care As members of the Illinois community, we each have a responsibility to express care and concern for one another. If you come across a classmate whose behavior concerns you, whether in regards to their well-being or yours, we encourage you to refer this behavior to the Student Assistance Center (217-333-0050 or http://odos.illinois.edu/community-of-care/referral/. Based on your report, the staff in the Student Assistance Center reaches out to students to make sure they have the support they need to be healthy and safe. Further, as a Community of Care, we want to support you in your overall wellness. We know that students sometimes face challenges that can impact academic performance (examples include mental health concerns, food insecurity, homelessness, personal emergencies). Should you find that you are managing such a challenge and that it is interfering with your coursework, you are encouraged to contact the Student Assistance Center (SAC) in the Office of the Dean of Students for support and referrals to campus and/or community resources.

Students with Disabilities To obtain disability-related academic adjustments and/or auxiliary aids, students with disabilities must contact the course instructor as soon as possible and provide the instructor with a Letter of Academic Accommodations from Disability Resources and Educational Services (DRES). To ensure that disability-related concerns are properly addressed from the beginning, students with disabilities who require assistance to participate in this class should apply for services with DRES and see the instructor as soon as possible. If you need accommodations for any sort of disability, please speak to me after class, or make an appointment to see me or see me during my office hours. DRES provides students with academic accommodations, access, and support services. To contact DRES, you may visit 1207 S. Oak St., Champaign, call 217-333-1970, e-mail disability@illinois.edu or visit the DRES website at http://www.disability.illinois.edu/. Here is the direct link to apply for services at DRES, https://www.disability.illinois.edu/applying-services.

Disruptive Behavior Behavior that persistently or grossly interferes with classroom activities is considered disruptive behavior and may be subject to disciplinary action. Such behavior inhibits other students' ability to learn and an instructor's ability to teach. A student responsible for disruptive behavior may be required to leave class pending discussion and resolution of the problem and may be reported to the Office for Student Conflict Resolution (https://conflictresolution.illinois.edu; conflictresolution@illinois.edu; 333-3680) for disciplinary action.

Emergency Response Recommendations Emergency response recommendations and campus building floor plans can be found at the following website: https://police.illinois.edu/em/run-hide-fight/. I encourage you to review this website within the first 10 days of class.

Religious Observances Illinois law requires the University to reasonably accommodate its students' religious beliefs, observances, and practices in regard to admissions, class attendance, and the scheduling of examinations and work requirements. Students should complete the Request for Accommodation for Religious Observances form should any instructors require an absence letter in order to manage the absence. In order to best facilitate planning and communication between students and faculty, students should make requests for absence letters as early as possible in the semester in which the request applies.

Sexual Misconduct Reporting Obligation The University of Illinois is committed to combating sexual misconduct. Faculty and staff members are required to report any instances of sexual misconduct to the University's Title IX and Disability Office. In turn, an individual with the Title IX and Disability Office will provide information about rights and options, including accommodations, support services, the campus disciplinary process, and law enforcement options.

A list of the designated University employees who, as counselors, confidential advisors, and medical professionals, do not have this reporting responsibility and can maintain confidentiality, can be found here: wecare.illinois.edu/resources/students/#confidential.

Other information about resources and reporting is available here: wecare.illinois.edu.