

# Engineering Innovation in Medicine

## Design Sequence

### EE400B Fall 3 Credit Course

Tuesday, Thursday 3:30 - 4:50 pm

Instructors: Jonathan Posner, Jonathan Liu, Eric Seibel

- Curious how medical technologies are developed?
- Want to apply what you study to health and medical problems?
- Want to make a difference improving quality of life through medicine?
- Feeling entrepreneurial?

The college of engineering is offering a three-quarter capstone design sequence focusing on developing engineering solutions to pressing challenges in medicine. Students from across the engineering disciplines will work with doctors and engineering faculty to understand the clinical need as well as design, fabricate, and test a working prototype device. EE400B is the first course in the three-quarter capstone sequence in biomedical technologies. This course is an introduction to the modern influence of engineering on medicine and health sciences. It is a project based class designed for senior level mechanical, bioengineering, and electrical engineering students (juniors require instructor's permission) who are interested in pursuing a Capstone/senior design project on a medical related topic, working in biomedical fields, pursuing a healthcare degree, or understanding how engineers can contribute improving the quality of life through medicine and reducing risks & costs of health care. This course will include introductory lectures on medicine, how engineers contribute, need finding, design, regulation, insurance reimbursement, and intellectual property (i.e. patents). There will be several field trips to UW medicine to interact with medical technologies and observe medicine in practice. The course will also have lectures by successful biomedical entrepreneurs on their product evolution, challenges, and impact. Students will select pilot projects for the quarter and work in teams to assess its viability for further development in a full project. Completion of this course will provide eligibility for seniors to join interdisciplinary teams of students (ME, EE, BioE) in the Engineering Innovation in Medicine Capstone sequence that continues in winter and spring quarters.

**team based projects • no exams • contact J. Posner with questions: [jposner@uw.edu](mailto:jposner@uw.edu)**

**Invited lectures by medical professionals & seasoned biotech entrepreneurs**

**Field trips to UW Medicine**

**Visit: [eih.uw.edu](http://eih.uw.edu) for more information**

**Mechanical, Electrical, and Bio- Engineering Interdisciplinary Capstone Sequence**  
**Engineering Innovation in Medicine**  
**Autumn 2017 – Winter 2018 – Spring 2018**

This Capstone sequence focuses on interdisciplinary teams of engineering students working collaboratively to develop technical solutions to pressing medical challenges. Engineering students will earn credits in their home departments working together across engineering disciplines. The teams will be advised by faculty in Mechanical, Electrical, and Bioengineering as well as mentors in the health sciences (e.g. emergency medicine, radiology, neurosurgery).

Electrical Engineering students can form 3-quarter capstone project teams with other EE, ME, and BioE students by taking ME-414 / EE-400B in Autumn. These teams can take ME-416 / EE-400B or EE-436 in Winter, leading up to the capstone design course EE-438 in Spring. EE-433 is needed for students in the Analog Circuits track, and EE-436 is needed for students in the Biomedical Instrumentation track. EE-438 in the Spring supports both of these tracks.

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**Autumn 2017:**

ME-414 / EE-400B: Engineering Innovation in Medicine. (3 credits, Posner)

An introductory, lecture based course focusing on medicine, how engineers contribute, identify applications, and work with other medical professionals to develop new solutions for health care. Historical examples of the application of engineering to medicine, design, regulation, insurance reimbursement, and intellectual property (i.e. patents). Several field trips to UW medicine to interact with medical technologies and observe medicine in practice. Students will work on a quarter long pilot project evaluating potential topics for a capstone design. At the end of this course, medical challenges will be down selected and capstone teams will be formed. No prerequisites.

EE-433: Analog Circuit Design. (5 credits, Darling)

Design of analog circuits and systems applying modern integrated circuit technology: operational amplifiers, differential amplifiers, active filters, voltage references and regulators. EE students are strongly advised to also take this course to provide a solid foundation in circuit design skills that will be used for the capstone project. Prerequisite: EE-332.

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**Winter 2018:**

ME-416 / EE-400B: Engineering Innovation in Medicine Design Preparation. (3 credits, Posner)

Team based design of solutions to challenges in healthcare. Second course in a health focused senior capstone design project sequence. Student teams are asked to define the clinical need, identify core functions and design specifications, identify prior art, ideate and evaluate designs, and develop engineering models of designs. Prerequisite: ME-414 / EE-400B.

EE-436: Medical Instrumentation. (4 credits, Darling)

The application of electronic instrumentation to medicine. Topics include biopotentials, bioelectrodes, electrophysiology, electrical safety, circulation, ventilation, respiration, thermoregulation, metabolism, and electrostimulation. Capstone teams will use this course to further refine their project in preparation for the design, prototyping and testing in the Spring. Prerequisites: EE-332. EE-400D is recommended.

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**Spring 2018:**

EE-438: Instrumentation Design Project (ABET capstone design course). (5 credits, Darling)

This is a team based capstone design course focusing on design, construction, test, and evaluation of a prototype medical technology/device. Emphasis is on modern design processes and the use of engineering standards. Prerequisites: EE-433 and/or EE-436.

**Questions? Visit [eih.uw.edu](http://eih.uw.edu) or contact Jonathan Posner ([jposner@uw.edu](mailto:jposner@uw.edu)) [ME],  
or Bruce Darling ([bruced@uw.edu](mailto:bruced@uw.edu)) [EE].**