EE400B Fall 3 Credit Course
Tuesday, Thursday 3:30-4:50 pm
Instructors: Jonathan Posner, Kat Steele, Keith Chan, Jon Liu, Bruce Darling

- 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?

EE400 (colisted with ME414/ME498G) is a design course focusing on developing engineering solutions to pressing challenges in medicine and health.

- Introduction to the modern influence of engineering on medicine and health sciences.
- Lectures on medicine, need finding, design, regulation, insurance reimbursement, and intellectual property (i.e. patents).
- Field trips to UW medicine to interact with medical technologies and observe medicine in practice.
- Provides eligibility for seniors to join interdisciplinary teams of students in the Engineering Innovation in Medicine Capstone sequence that continues in winter and spring quarters.
- Project based course for students interested in pursuing a Capstone project on a medical related topic, working in biomedical fields, pursuing a healthcare degree, or understanding how engineers contribute to improving quality of life through medicine.
- Students from across the engineering disciplines will work with doctors, nurses and a wide variety of clinicians and engineering faculty to understand the clinical need as well as design, fabricate, and test a working prototype device over three quarters.

Team based project assignments • no exams • contact Profs. Darling (bruced@uw.edu) or Posner (jposner@uw.edu)

Invited Lectures and Field Trips:
- Institute for Simulation and Interprofessional Studies, UW Medicine
- Neonatal Intensive Care Unit, UW Medicine, Taylor Sawyer, MD
- Fred Silverstein, MD, Clinical Prof. Medicine; Founder of UW GI Endoscopy Service
- Keith Chan, MD, Diagnostic Radiology
- Tom Satagaj, Esq, Partner at Seed IP
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 2016. These teams can take ME-416 / EE-400B or EE-436 in Winter 2016, leading up to the capstone design course EE-438 in Spring 2017. EE-433 is needed for students in the Analog Circuits concentration, and EE-436 is needed for students in the Biomedical Instrumentation concentration. EE-438 in the Spring supports both of these concentrations.

### Autumn 2016:

**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.

### Winter 2017:

**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-400B is recommended.

### Spring 2017:

**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. EE-400B is recommended.

Questions? Contact Jonathan Posner (jposner@uw.edu) [ME], or Bruce Darling (bruced@uw.edu) [EE].