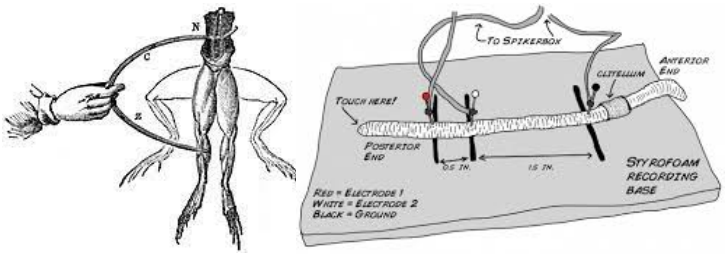
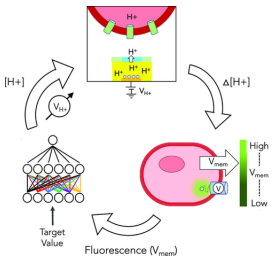
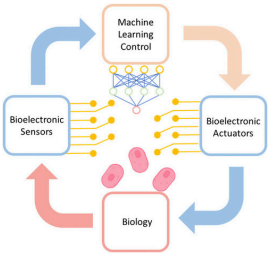
ECE 104/204
Bioelectronics
Prof. Marco Rolandi
https://rolandi.soe.ucsc.edu







Overview

Bio-electronics covers bioelectronic principles and devices ranging from biomedical devices already in the clinic including pacemakers and implants for deep brain stimulation, to advanced devices for sensing and stimulation including flexible electronics, organic bioelectronics, and nanobioelectronics for single cell interfacing. A brief historical overview is presented. The class is based on case studies. Each case study approximately corresponds to one week of class.

Lecture Times and Location

Spring 2021: Tu-Th 11:40- 1 15 pm via zoom

We will adopt an active learning strategy. Research has shown that active learning, especially in smaller advanced classes, leads to improved learning outcomes respect to traditional lecturing. Students are expected to read the assigned materials and watch the recorded lectures before coming to class. Class time will be used for an open discussion on the material.

Topics covered

1.What is bioelectronics?; 2. Galvani and animal electricity; 3.The Squid Giant Axon; Case 4. The Pace Maker; 5. Deep Brain Stimulation; 6. Organic Bioelectronics; 7.Bionanoelectronics and Optogenetics; 8. Bioprotonics; 9. Electroceuticals; X: Bioelectricity and regeneration.

Book and assessment

There is no book. 3-5 papers from the literature will be provided for each case study. No final exam. Assessment will be based on 5 reports, 4 homework sets, and an optional final presentation than can be used to replace the lowest grade of one of the reports.