

BIOEN6460/PHYSIOL6460

Electrophysiology and Bioelectricity of Tissues

Contact

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Required Materials

Course Textbook: None

Readings will be assigned throughout the course.

Software: Matlab

Further software (freeware) will be used throughout the course.

Optional Literature

Bioelectricity: A Quantitative Approach, Plonsey and Barr, Springer

Bioelectromagnetism, Malmivuo and Plonsey, Springer, <http://www.bem.fi/book/index.htm>

Computational Cardiology, Sachse, Springer

Description

The goal of this class is to provide an intermediate level overview of electrophysiology and bioelectricity at the tissue level to graduate students with special interest in cardiology and neurosciences. We will develop the central electrical mechanisms from sets of coupled cells to the intact organ, building on those mechanisms that are common to many electrically active cells in the body. We will provide insights into the structural basis of electrical conduction in tissue. The approach will be a combination of qualitative explanations, quantitative analysis, and mathematical simulation. The class format will include didactic lectures, group discussion of primary literature, quantitative problem-solving exercises, writing assignments, and laboratory experiences.

The prerequisite for the course are Bioengineering 6000, 6003 or equivalent or permission of the instructor and knowledge of university undergraduate level calculus and physics.

Assignments will require the use of Matlab and other software. All course materials will be available through the University of Utah Canvas software and the class will communicate using this software.

Outcomes

By the end of this course, students will:

- have fundamental knowledge of tissue electrophysiology and bioelectricity
- understand approaches for computational modeling of conduction
- have basic insights into conduction disturbance, in particular, cardiac arrhythmia

Teaching and Learning Methods

The class format will include didactic lectures, review of primary literature, quantitative problem-solving exercises, writing assignments, and laboratory exercise.

Schedule

Class times: Tuesday and Thursday, 10:45-12:05

Classroom: Old Conference Room, CVRTI

For detailed lecture, lab, homework and exam schedule see Canvas.

Grading

45% Lab reports (3x 15%)

20% Homework (2x 10%)

35% Midterm and Final Exam (2x 17.5%)

Class Policies

Attendance and Punctuality: Regular attendance is required at all class meetings and laboratories. Moreover, this course is discussion-oriented and requires your presence in the classroom. You are expected to attend class and laboratories on time.

Etiquette: Please maintain an environment conducive to learning by observing the following: arrive on time to class; make sure that your phone is either off or on silent before class begins; and use laptops/tablets/other electronic devices for class activities only. If you need to take a phone call, please leave the classroom when doing so. Texting during class is not permitted.

University Policies

Academic Honesty. The University of Utah maintains a strict policy regarding academic misconduct. “Academic misconduct” includes, but is not limited to, cheating, misrepresenting one's work, inappropriately collaborating, plagiarism, and fabrication or falsification of information, as defined further below. It also includes facilitating academic misconduct by intentionally helping or attempting to help another to commit an act of academic misconduct. A student who engages in academic misconduct may be subject to academic sanctions including but not limited to a grade reduction, failing grade, probation, suspension or dismissal from the program or the University, or revocation of the student's degree or certificate. Please see <http://regulations.utah.edu/academics/6-400.php> for more information.

The Americans with Disabilities Act. The University of Utah seeks to provide equal access to its programs, services, and activities for people with disabilities. If you will need accommodations in this class, reasonable prior notice needs to be given to the Center for Disability Services, 162 Olpin Union Building, (801) 581-5020. CDS will work with you and the instructor to make arrangements for accommodations. All written information in this course can be made available in an alternative format with prior notification to the Center for Disability Services.

Addressing Sexual Misconduct. Title IX makes it clear that violence and harassment based on sex and gender (which includes sexual orientation and gender identity/expression) is a civil rights offense subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories such as race, national origin, color, religion, age, status as a person with a disability, veteran's status or genetic information. If you or someone you know has been harassed or assaulted, you are encouraged to report it to the Title IX Coordinator in the Office of Equal Opportunity and Affirmative Action, 135 Park Building, 801-581-8365, or the Office of the Dean of Students, 270 Union Building, 801-581-7066. For support and confidential consultation, contact the Center for Student Wellness, 426 SSB, 801-581-7776. To report to the police, contact the Department of Public Safety, 801-585-2677(COPS).

Note: *This syllabus has been created as a guide to the class and is as accurate as possible. However, all information is subject to change as class needs change. Any changes will be discussed in advance during class sessions.*