

# BME6460

## Electrophysiology and Bioelectricity of Tissues

### Contact

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### Instructors

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### Required Materials

Course Textbook: None

Readings will be assigned throughout the course.

Software: Matlab and other software (freeware) will be used throughout the course.

### Optional Literature

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

Bioelectricity: A Quantitative Approach, Plonsey and Barr, Springer

Computational Cardiology, Sachse, Springer

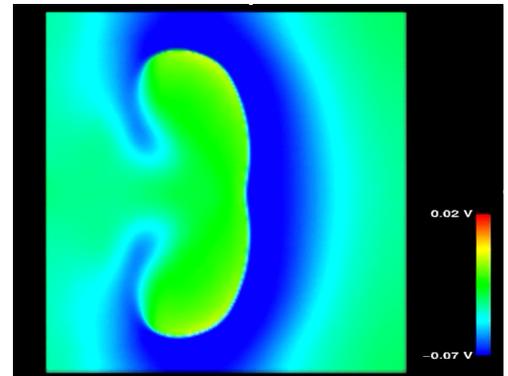
Foundations of Cellular Neurophysiology, Johnson and Wu, MIT Press

### 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 a 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 and modeling of electrical conduction in tissue. The approach will be a combination of qualitative explanations, and quantitative analyses. The class format will include didactic lectures, group discussions of primary literature, quantitative problem-solving exercises, writing assignments, and laboratory experiences.

The prerequisite for the course is BME 6000, 6003, 6430, 6440, 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 intermediate-level knowledge of tissue electrophysiology and bioelectricity
- understand methods for computational modeling and simulation of electrical fields, conduction and stimulation in tissue

- have insights into approaches for the clinical diagnosis and therapy based on tissue electrophysiology and bioelectricity

## Teaching and Learning Methods

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

## Schedule

Class times: Tuesday and Thursday, 9:10-10:30

Classroom: WEB 2470

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

## Grading

50% Lab reports (4x 12.5%)

10% Homework (2x 5%)

40% Midterm and final exam (2x 20%)

## 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.

## College Guidelines

The guidelines are posted at <https://www.coe.utah.edu/students/current/semester-guidelines/>.

## 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.

**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.*