BIOE - Bioelectrics

BIOELECTRICS Courses

BIOE 454/554. Introduction to Bioelectrics. 3 Credits.
Covers the electrical properties of cells and tissues as well as the use of
electrical and magnetic signals and stimuli in the diagnosis and treatment
of disease. Typical topics to be covered include basic cell physiology,
endogenous electric fields in the body, electrocardiography, cardiac pacing,
defibrillation, electrotherapy, electroporation, and electrotherapy in wound
healing. In addition, ultrashort electrical pulses for intracellular manipulation
and the application of plasmas to biological systems will be covered.
Prerequisites: PHYS 111N or higher and MATH 200 or higher.

BIOE 554. Introduction to Bioelectrics. 3 Credits.
Covers the electrical properties of cells and tissues as well as the use of
electrical and magnetic signals and stimuli in the diagnosis and treatment
of disease. Typical topics to be covered include basic cell physiology,
endogenous electric fields in the body, electrocardiography, cardiac pacing,
defibrillation, electrotherapy, electroporation, and electrotherapy in wound
healing. In addition, ultrashort electrical pulses for intracellular manipulation
and the application of plasmas to biological systems will be covered.
Prerequisites: PHYS 111N or higher and MATH 200 or higher.

BIOE 754. Advanced Bioelectrics. 3 Credits.
Bioelectrics is a new field encompassing both the science and technology
of applying electrical stimuli to biological systems. This course covers the
pulsed power technology that is required to generate electrical stimuli as
well as the biological responses they evoke in cells and tissues. Particular
emphasis is placed on the medical applications of bioelectrics, including
tumor ablation, gene electrotransfer, wound healing, decontamination with
cold plasma, and treatment of cardiac arrhythmias. Prerequisite: ECE 454 or
ECE 554 or BIOE 454 or BIOE 554.

BIOE 755. Biomembranes and Ion Channels. 3 Credits.
This course will give an overview of the structure and dynamics of
biomembranes, the ion channels that are embedded in them, and the
electrical properties of biomembranes. Topics include molecular dynamics
modeling of biomembranes, membrane damage and repair, ion channel
dynamics and their experimental assessment using patch clamping, and
excitability in neurons and cardiomyocytes. Prerequisite: ECE 454 or
ECE 554 or BIOL 523.

BIOE 854. Advanced Bioelectrics. 3 Credits.
Bioelectrics is a new field encompassing both the science and technology
of applying electrical stimuli to biological systems. This course covers the
pulsed power technology that is required to generate electrical stimuli as
well as the biological responses they evoke in cells and tissues. Particular
emphasis is placed on the medical applications of bioelectrics, including
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excitability in neurons and cardiomyocytes. Prerequisite: ECE 454 or
ECE 554 or BIOL 523.

BIOE 890. Graduate Seminar. 2 Credits.
This course can be taken either as an attendee or as a presenter. Attendees
will receive a pass/fail grade based on whether they satisfy the attendance
requirements. Presenters will receive a letter grade for their presentation
from a committee of faculty in the audience.

BIOE 891. Graduate Seminar. 1 Credit.
This course can be taken either as an attendee or as a presenter. Attendees
will receive a pass/fail grade based on whether they satisfy the attendance
requirements. Presenters will receive a letter grade for their presentation
from a committee of faculty in the audience.