

Advanced Topics in Cardiac Electrophysiology

Course Directors: David Christini, Ph.D. and Trine Krogh-Madsen, Ph.D.

When: Quarter I; Tuesdays and Thursdays 10am - 12pm.

Location: Starr 460 (except as otherwise noted).

Grading: Based on student participation and end-of-course student presentation.

Summary: This course will survey current areas of scientific interest in cardiac electrophysiology. Material for this course will include: introduction to cardiac electrophysiology (ion channels, action potentials, basics of cardiac electrophysiology); basic and clinical aspects of cardiac arrhythmia; dynamics, initiation, maintenance, and termination of arrhythmia; atrial and ventricular fibrillation and defibrillation; experimental methods; and mathematical modeling. The course will be comprised of lectures as well as moderated videotaped presentations recorded recently by international experts in the field.

Introduction to cardiac electrophysiology

9/5	Ion channels, session 1	Christini
9/7	Ion channels, session 2	Christini
9/12	Basics of cardiac electrophysiology	Christini
9/14	The specialized conduction system of the heart	Krogh-Madsen

Mathematical modeling in cardiac electrophysiology

9/19	Ionic models	Krogh-Madsen
9/21	Markovian ion channel models (Clancy video)	Krogh-Madsen
9/26	Modeling Ca^{2+} dynamics (Shiferaw video)	Krogh-Madsen

Dynamics of arrhythmogenesis

9/28	Initiation of ventricular arrhythmias (in A-321)	Krogh-Madsen
10/3	Dynamics of ventricular arrhythmias (Garfinkel video)	Christini
10/5	Cardiac alternans (Weiss video)	Christini
10/10	Dynamics of conduction block (Gilmour video)	Gong
10/12	Ischemia and structural heterogeneity	Krogh-Madsen
10/17	Non-sustained cardiac reentry (Glass video) (in A-321)	Krogh-Madsen

Ventricular arrhythmias and their termination

10/19	Ventricular arrhythmias and their termination	Krogh-Madsen
10/24	Clinical aspects of VT (Stevenson video)	Christini
10/26	Low voltage defibrillation (Efimov video)	Christini

Atrial arrhythmias

10/31	Atrial activation and arrhythmias	Gong
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Student presentations

11/2	No session	
11/7	Student presentations	Christini & K-M
11/9	Student presentations	Christini & K-M