UNIVERSITÀ DI PAVIA

Anno Accademico 2021/2022

MEMBRANE BIOPHYSICS AND ELECTROPHYSIOLOGY

Enrollment year	2021/2022
Academic year	2021/2022
Regulations	DM270
Academic discipline	BIO/09 (PHYSIOLOGY)
Department	DEPARTMENT OF BIOLOGY AND BIOTECHNOLOGY "LAZZARO SPALLANZANI"
Course	NEUROBIOLOGY
Curriculum	PERCORSO COMUNE
Year of study	1°
Period	1st semester (01/10/2021 - 14/01/2022)
ECTS	9
Lesson hours	72 lesson hours
Language	Italian
Activity type	WRITTEN AND ORAL TEST
Teacher	BIELLA GERARDO ROSARIO (titolare) - 9 ECTS
Prerequisites	Basic knowledge in Mathematics, Physics, Chemistry and General Physiology.
Learning outcomes	This course examines the origins and modern discoveries regarding the fundamental principals underlying the workings of biological membranes and their components, with particular emphasis on the structure and function of ion channels and their role in electrically excitable membranes. Next, their roles in context of neurophysiological function will be examined.
Course contents	Biomedical signals. Electrical signals derived from the nervous system. Recording and interpretation of electrophysiological signals. Extra- and intracellular recordings. The techniques of voltage-clamp and patch-clamp. The electrical properties of the membrane:: Nernst equation. Passive

	electrical properties of the membrane. The genesis of membrane potential. The action potential. Classical biophysics of squid giant axon according to the model of Hodgkin e Huxley. Biophysical parameters of Na+, K+, and Ca2+ macroscopic currents and conductances. Analysis of single channel ionic currents; biophysical parameters of single channel events. Physiological roles of ionic channels. Ionic channel modulation. General aspects of signal transduction.
Teaching methods	The course is organized in lectures using Power Point presentations and the blackboard. During the lessons problems will be proposed to the students to verify their learning of the theoretical concepts presented and whose solution will be shown during the next lessons. Furthermore, during the course an individual computer exercise will be made concerning some biophysical properties of the sodium channel according to the Hodgkin and Huxley model.
Reccomended or required readings	1) On line slides at the web page: http://www-3.unipv.it/tslmra22/ 2) Byrne-Roberts; From Molecules to Networks; Ed. Elsevier
Assessment methods	The final examination consists in a written test with problems followed by an oral examination about arguments of the course.
Further information	Further information concerning the program of the course and lecture presentations are available at Prof. Toselli web page: www-1.unipv.it/tslmra22/.
Sustainable development goals - Agenda 2030	$lbl_legenda_sviluppo_sostenibile