MEDICAL BIOTECHNOLOGY AND NANOBIOTECHNOLOGY (LM49)

(Lecce - Università degli Studi)

Teaching BIOPHYSICS

GenCod A005666

Owner professor Tiziano VERRI

Teaching in italian BIOPHYSICS

Teaching BIOPHYSICS

SSD code BIO/09

Reference course MEDICAL BIOTECHNOLOGY AND

Course type Laurea Magistrale

Credits 6.0

Teaching hours Front activity hours: 50.0

For enrolled in 2019/2020

Taught in 2020/2021

Course year 2

Language ENGLISH

Curriculum IN INGEGNERIA TISSUTALE

Location Lecce

Semester First Semester

Exam type

Assessment

Course timetable
https://easyroom.unisalento.it/Orario

BRIEF COURSE DESCRIPTION

Lectures

Molecular foundations of biophysics

- the subject matter of molecular biophysics
- molecular recognition
- molecule-molecule interaction
- reception
- intercellular interactions

The thermodynamics of non-equilibrium systems

- the dissipation function
- the coupling of chemical reactions
- the steady-state of a linear system
- the coupling of chemical reactions with diffusion processes
- processes remote from equilibrium
- entropy
- entropy and information in biology

Membrane transport

- cell membranes
- the thermodynamics of passive membrane transport
- the thermodynamics of active membrane transport
- the thermodynamic model of the sodium-potassium pump
- the model theory of passive membrane transport
- the model theory of active membrane transport
- the structure of membranes
- the conformational properties of membranes
- induced ion transport

Nerve impulses

- axons and nerve impulses
- propagation of the nerve impulse
- generation of the impulse
- activation and inactivation of sodium conductivity
- synaptic transmission

Labs

- Methods, protocols and equations to study membrane biophysics and membrane protein functioning
- Protein databank querying and consulting

REQUIREMENTS

No formal prerequisites are required with respect to other courses. However, basic knowledge of general physics, physical chemistry and general physiology is recommended. This knowledge is normally acquired in the Bachelor's degrees that give access to the Master's degree in Medical Biotechnology and Nanobiotechnology.

COURSE AIMS

This course aims at providing students with an in-depth knowledge of the current view of membrane biophysics, the role as a barrier played by the membrane and the roles played by channels, carriers and receptors in the membrane physiology. The course also aims at highlighting the spatial organization of membrane proteins, their structures and how their major structural elements make them work efficiently. Major methodological approaches to membrane biophysics including their powers and limitations will be also discussed.

TEACHING METHODOLOGY	Learning methods consist of formal lectures and integrative lectures held using slides and hypertext links to specific Web sites (5 credits = 40 hours), followed by practical laboratory classes (1 credit = 10 hours). Outside these activities, the students are expected to read assigned papers from the scientific literature.
ASSESSMENT TYPE	Oral examination. It is aimed at ascertaining, in proportion: - the level of theoretical knowledge through the presentation of the program topics (50%) - the level of practical abilities through description of methods and methodologies (20%) - the ability to apply theoretical knowledge and practical skills to solve simple problems (30%)
REFERENCE TEXT BOOKS	FISIOLOGIA GENERALE. PRINCIPI. Autore: D. Cremaschi. Edi. Ermes AN INTRODUCTION TO BIOLOGICAL MEMBRANES. FROM BILAYERS TO RAFTS. Author: W. Stillwell. Elsevier Science ESSENTIALS OF MEMBRANE BIOPHYSICS. Author: N. Sperelakis. Academic Press