Testi del Syllabus

Resp. Did. LORENZON PAOLA Matricola: 005762

Docenti
BERNAREGGI ANNALISA, 2 CFU
LORENZON PAOLA, 4 CFU
SCIANCALEPORE MARINA, 3 CFU

Anno offerta: 2024/2025
Insegnamento: 972SV - MOLECULAR NEUROPHYSIOLOGY
Corso di studio: SM75 - NEUROSCIENCE
Anno regolamento: 2024
CFU: 9
Settore: BIO/09
Tipo Attività: B - Caratterizzante
Anno corso: 1
Periodo: Primo Semestre
Sede: TRIESTE

Testi in italiano

Lingua insegnamento INGLESE

Contenuti (Dipl.Sup.) Knowledge and understanding of the fundamental mechanisms regulating signal transduction and synaptic transmission in the central and peripheral nervous systems.


Obiettivi formativi
1) Knowledge and understanding
   The purpose of the course is to provide a sound basis of membrane biophysics, ion channels and receptors to understand the fundamental molecular processes responsible for chemical and electrical cell communication. In particular, the course will focus on the mechanisms responsible for cellular excitability, in both central and peripheral nervous systems. The students will also learn the principal experimental methods for in vitro studies at the single cell level.
2) Applying knowledge and understanding
   The students will acquire the ability to design the most appropriate experimental plan to investigate molecular mechanisms involved in cell signalling in excitable cells.
3) Making judgements
   The students will develop abilities for the critical reading of scientific publications, analysis and interpretation of scientific data in the field of cell communication in neurobiology.
4) Communication skills
   The written test and the oral examination encourage the students to develop scientific writing abilities and oral communication skills.
5) Learning skills
   At the end of the course the students will posses knowledge and critical
reading abilities to continue their training independently, adapting themselves to new knowledge and technologies in cell signalling in neurobiology.

**Prerequisiti**

Knowledge of the fundamental principles of cell biology.

**Metodi didattici**

Lectures and tutorial activities. All course materials (e.g. slides shown during lectures, original articles, notes) are available on the Moodle platform.

**Altre informazioni**

Any necessary change in the course modalities will be published at the Department, Master Programme and Course websites.

**Modalità di verifica dell'apprendimento**

Written test (multiple-choice) on topics covered during the course. The test consists of 30 questions (10 for each Part of the course). The time limit for writing the test is 35 minutes. Each question has 3 or 4 choices and only 1 correct answer. The evaluation rules are the following: for each correct answer 1 point; no answer 0 points; for each wrong answer -0.5 points. The written test is passed if the total is ≥18/30.

**Programma esteso**

Contents of the course will be discussed in the light of recent theoretical concepts and experimental data about mechanisms regulating signal transduction, electrical membrane properties of excitable cells and the organization of central and peripheral synapses. The course consists of three Parts and the contents are illustrated hereafter.

**Part 1: Signal transduction.**


**Part 2: Synaptic transmission in CNS.**

Characterization of ion channels, intrinsic membrane electrical properties of neurons, pacemaker mechanisms. Principles of chemical and electrical synaptic transmission: quantal release, neurotransmitters, synaptic receptors, integration of synaptic potentials, synaptic plasticity.

**Part 3: Synaptic transmission in PNS.**

The neuromuscular junction: anatomic organization, role of trophic factors in neuromuscular junction development (agrin, MusK and rapsyn), properties of neuromuscular nicotinic cholinergic receptors (fetal and adult). Disorders in the neuromuscular junction: myasthenia gravis, the Lambert-Eaton myasthenic syndrome, the congenital myasthenic syndrome and the muscular dystrophies.

**Obiettivi Agenda 2030 per lo sviluppo sostenibile**

The contents are about topics for Sustainable Development approved by United Nations Member States (Agenda 2030). Specifically, N.3 Health and wellbeing N.4 Education of quality.

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**Testi in inglese**
Knowledge and understanding of the fundamental mechanisms regulating signal transduction and synaptic transmission in the central and peripheral nervous systems.


Selected scientific papers or other didactical material could be provided.

1) Knowledge and understanding
The purpose of the course is to provide a sound basis of membrane biophysics, ion channels and receptors to understand the fundamental molecular processes responsible for chemical and electrical cell communication. In particular, the course will focus on the mechanisms responsible for cellular excitability, in both central and peripheral nervous systems. The students will also learn the principal experimental methods for in vitro studies at the single cell level.

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Knowledge of the fundamental principles of cell biology.

Lectures and tutorial activities.
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The course consists of three Parts and the contents are illustrated hereafter.
Intracellular receptors. Receptor tyrosine kinases. G protein-coupled receptors. Signaling through second messengers. Regulation of the intracellular Ca2+ homeostasis. Spatial and temporal organization of intracellular Ca2+ signalling: oscillations and waves. Spatial organization of the intracellular cAMP signalling. Experimental approaches to study the...
signal transduction in living cells: fluorescent probes and imaging techniques.
Part 2: Synaptic transmission in CNS.
Characterization of ion channels, intrinsic membrane electrical properties of neurons, pacemaker mechanisms. Principles of chemical and electrical synaptic transmission: quantal release, neurotransmitters, synaptic receptors, integration of synaptic potentials, synaptic plasticity.
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