



CELLULAR NEUROPHYSIOLOGY

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	2nd semester (01/03/2022 - 14/06/2022)
ECTS	9
Lesson hours	72 lesson hours
Language	Italian
Activity type	ORAL TEST
Teacher	BIELLA GERARDO ROSARIO (titolare) - 3 ECTS MASETTO SERGIO - 3 ECTS SPAIARDI PAOLO - 3 ECTS
Prerequisites	First-level knowledge in: electricity and diffusion; physiology of biological membranes and membrane transports; cell physiology; physiology of the nervous system and sensory organs.
Learning outcomes	This course is intended to analyze the phenomenological and biophysical aspects and molecular mechanisms of the physiological processes which, by taking place in the cell membrane or in the cytoplasm, underlie, at the cellular level, the communication and information processing functions typical of neurons and other cell types of neurophysiological interest.
Course contents	The course comprises three modules, the contents of which are described below.

Part 1. The physiology of neurons (3 CFU). 1) Neuronal encoding. Diversity of neuronal firing patterns. Ion conductances involved in determination of firing pattern. Modulation of neuronal firing properties. Spontaneous firing. Subthreshold activities.

Part 2. The physiology of synaptic transmission. Electrical synapses: gap junctions. Chemical synapses. Postsynaptic mechanisms: synaptic potentials and currents; synaptic receptors. Presynaptic mechanisms: quantal neurotransmitter release. Molecular basis of synaptic vesicle release. Fast and slow synaptic transmission. Synaptic integration. Synaptic plasticity: LTP and LTD. Molecular basis of plastic synaptic processes. Roles of calcium in controlling neuronal functions.

Part 3. The physiology of sensory receptors (3 CFU). Cell physiology of sensory functions. Sensory receptors. Photoreceptors. Hair cells. The olfactory epithelium.

Teaching methods

The course is organized in lectures using Power Point presentations and the blackboard.

Reccomended or required readings

Slides will be provided to the students attending the course.
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Assessment methods

The final examination consists, for each module, in an oral examination about arguments of the module.

Further information

Further information concerning some parts of the course and Power Point presentations are available at Prof. Toselli web page:
<http://www-1.unipv.it/tsImra22/>.

Sustainable development goals - Agenda 2030

[The goals](#)