UNIVERSITÀ DI PAVIA

Anno Accademico 2021/2022

PHYSIOLOGY

Enrollment year	2019/2020
Academic year	2021/2022
Regulations	DM270
Academic discipline	BIO/09 (PHYSIOLOGY)
Department	DEPARTMENT OF BIOLOGY AND BIOTECHNOLOGY "LAZZARO SPALLANZANI"
Course	BIOTECHNOLOGY
Curriculum	Medico
Year of study	3°
Period	2nd semester (01/03/2022 - 14/06/2022)
ECTS	6
Lesson hours	48 lesson hours
Language	Italian
Activity type	ORAL TEST
Teacher	ROSSI PAOLA (titolare) - 6 ECTS
Prerequisites	The course consists of two modules. The first introduces students to the study of physiology, and, specifically, to training in the field of Cellular Physiology. In order to acquire the relative knowledge, the student is required to have adequate knowledge of the chemical structure of the main biomolecules and of the structure of the cell membrane. These concepts will however be taken up again at the beginning of the course in a preliminary review of the course content. The second module introduces organ physiology. Prerequisites are the same as for the first module.
Learning outcomes	The educational objectives of the course are: 1. Know, understand, and remember the basis of cellular communication (carriers, ionic channels, membrane receptors, simple diffusion mechanism, and so on.) and the basis of the muscular contraction;

2. Be able to apply the acquired knowledge in different disciplinary context;
3. Achieved autonomy in critically reading, understanding and evaluating scientific literature in the field of Cellular Physiology;
4. Be able to communicate the knowledge learned in the specific field with a correct scientific language and scientific rigor;
5. To have acquired the cultural tools to allow the independent study of other topics related to the Cellular Physiology.

Course contents

COURSE PROGRAM
First module
? Introduction to the study of Physiology
? Different organization levels to the study of Physiology
? The intracellular and extracellular environment
? Control systems and homeostasis
? The plasma membrane and the exchange of matter and energy inside and outside.
? Ion channels: structure and function, ion channel systematic. The study of ion channels: patch-clamp. Analysis of bioelectric signals. The channelopathy
? carriers: structure and function
? Active and passive transports
? Water flows
? Osmotic pressure
? Absorbent and secreting epithelia. Trans epithelial transports
? Intercellular communication: gap junctions, paracrine and autocrine signals
? Membrane receptors and signal transduction pathways
? Excitable cells:
? Neurons
? Skeletal muscle cells
? Smooth muscle cells
? Cardiac muscle cells
? Electrical properties of the cellular membrane:
? Ionic gradients
? Generation of electrical signals
? Resting membrane potential
? Action potential. Examples and analysis of experimental data
? Signals transmission into axons
? Chemical synapses
? Electrical synapses
? Neuromuscular junction
? Sensory Physiology: General Principle of sensory trasduction.
? The muscle:
? Skeletal muscle
? Mechanism of muscle contraction
? Excitation and contraction coupling
? Regulation of muscle strength development
? Type of muscle fibres
? Muscle metabolism
? Smooth muscle
? Cardiac muscle

	Second Module * Cardiovascular system * Respiratory system * Renal system * Digestive system
Teaching methods	The following teaching methods and strategies will be used: • Frontal lessons • Problem solving methodology • Update seminaries • Watching video • Possible tutoring activity • Reading of a scientific paper
Reccomended or required readings	FISIOLOGIA, D. U. Silverthorn, Casa Editrice Ambrosiana
Assessment methods	The exam includes a written exam at the end of the course. The exam for the first module consists of 3 open-ended question and 15 closed-ended questions. The evaluation is expressed for open questions with a score from 0 to 5 and for closed questions with a score of 0/1. The open questions will evaluate the student's preparation on the topic, the use of specific scientific terminology and the skills acquired in general during the course. As far as the second module is concerned, the exam will consists of 20 written questions, where each correct answer scores 2. The types of questions, as well as the modality of evaluation of the answers score, will be described in detail in a dedicated lesson during the course. The same information will also be available as a pdf file in Kiro (together with the pdf files of all power point lessons).
Further information	The teacher responsible for the 1st module is available, by appointement, on friday morning. - Agenda 2030 - OSA - goal nimber 3 "health and Wellness" The teacher responsible for the 2nd module can always be contacted via email, also in order to arrange an appointment via zoom or in presence.
Sustainable development goals - Agenda 2030	GOOD HEALTH AND WELL-BEING QUALITY EDUCATION The goals