COURSE DETAILS

"HUMAN PHYSIOLOGY I"

SSD BIO/09

DEGREE PROGRAMME: MEDICINE AND SURGERY (P11)

ACADEMIC YEAR2024-2025

GENERAL INFORMATION-TEACHER REFERENCES

COORDINATOR : SABRINA DIANO PHONE: 0817463636 EMAIL: <u>sabrina.diano@unina.it</u>

Faculty	Position	Scientific	Phone	Reception	E-mail
		Fields:	746-	(day/time/building)	
Sabrina Diano	Full Professor	Physiology	3331	Wed. 14.00 – 16.00 Bldg 19, 9 th floor	sabrina.diano@unina.it
Monica Dentice	Associate Professor	Physiology	3636	Wed. 11.00 – 13.00 Bldg 19, 9 th floor	monica.dentice@unina.it
Ciro Menale	RTD A	Physiology	3331	Wed. 14.00 – 16.00 Bldg 19, 9 th floor	ciro.menale@unina.it

GENERAL INFORMATION ABOUT THECOURSE

TEACHINGLANGUAGE: ENGLISH YEAR OF THE DEGREE PROGRAMME: II SEMESTER: I CFU: 8

REQUIRED PRELIMINARY COURSES (IF MENTIONED IN THE COURSE STRUCTURE "REGOLAMENTO") None

PREREQUISITES

The student must know the general principles of physics, biophysics, biology, chemistry and mathematics in order to apply them to the functional study of the human body

LEARNING GOALS

The course aims to provide students with knowledge of transmembrane transport systems, the genesis of membrane potential, cellular excitability and the genesis of electrical signals at the basis of muscle and neurons activity. Starting from the principles of cellular and molecular physiology, the student will also acquire knowledge relating to the functions of muscular, cardiocirculatory, respiratory and renal systems, and the mechanisms of the main integrative processes. The course will be aimed at transmitting the operational skills necessary to concretely apply the knowledge acquired in clinics.

EXPECTED LEARNING OUTCOMES (DUBLIN DESCRIPTORS)

Knowledge and understanding

The student will acquire knowledge relating to cellular and molecular physiology, muscular, cardiovascular, respiratory and renal physiology and must be able to understand the mechanisms underlying complex homeostatic functions such as blood pressure control, hydroelectrolytic balance and pH control.

Applying knowledge and understanding

- Autonomy of judgement: The student must be able to independently analyze the main mechanisms underlying the functions of the human body with an integrated vision. The necessary tools and methods will be provided to enable students to develop these analytical and synthesis skills.
- Communication skills: The student must be able to present to non-expert people topics related to the different cellular and organ functions as well as concepts of integrative physiology, in oral and written form. The student will be stimulated to clearly elaborate the concepts, using the correct scientific terminology and to transmit the principles of physiology and their applicative potential to non-experts.
- Learning ability: The student will be encouraged to deepen independently his knowledge of the human body functions with the help of various teaching tools. The course will provide all the necessary indications and suggestions to address the study of topics necessary for the understanding of functions and mechanisms underlying individual physiological processes. In addition, the student will gradually acquire the ability to attend specialized seminars, conferences, master's courses, etc. in the fields of physiology.

COURSE CONTENT/SYLLABUS

1. Structure and functions of biological membranes and ion channels. Membrane transports. Cellular excitability: resting membrane potential and action potentials. Synaptic transmission and neuromuscular junction. The autonomic nervous system.

2. Cellular physiology of skeletal, smooth, and cardiac muscles. Mechanics of skeletal muscle; thermodynamics of skeletal muscle contraction and metabolism.

3. Electrical activity of the hearth. The heart as a pump: the cardiac cycle. Cardiac output. Control of cardiac output and blood pressure. The circulatory system and the hemodynamics laws. The capillary exchanges. Peripheral circulation: the coronary circulation.

4. Pulmonary circulation. Respiratory mechanics: lung volumes and capacities. Pulmonary ventilation. The alveolo-capillary exchanges. The transport of gases in the blood. Ventilation / perfusion ratio. The chemoreceptors in breath control. The respiratory centers. Adaptation to high altitude. Control of breathing during exercise.

5. Mechanisms of urine formation: glomerular filtration and tubulo-glomerular feedback. Tubular reabsorption and secretion. The countercurrent multiplier mechanism of the loop of Henle and urine concentration. Renal regulation of acid-base balance. The regulation of body fluids volume. Hydro-electrolyte balance. Urine composition. Control of renal circulation.

SCHEDULE OF THE COURSE					
Week	Day Hour	Prof	FormalLectures		
	13.00-15,30				
. ct	Tue, Oct 1st	Dentice			
1 st	Wed, Oct 2nd	Dentice	Cellular membranes and transmembrane transports o		
October1 st -4 th ,	Thur, Oct 3rd	Dentice	solutes and water. Principles of Electrophysiology. Synaptic		
2024	Fri, Oct 4th	Dentice	communication. Neurosecretion.		
	Tue, Oct 8 th	Dentice			
2 nd		Menale	Neurotransmitters. Synaptic integration and inhibition.		
October7 th -11 th ,			Temporal and spatial summation. Neuromuscular junction		
2024	Wed, Oct 9 th	Menale			
e rd	— — · · · · · · · · · · · · · · · · · ·				
3 rd	Tue, Oct 15"	Menale	Autonomic Nervous system.		
0ctober 1418, 2024	Wed Oct 16 th	Monalo	Skeletal Muscle, Muscle contraction, Eurotional organization		
2024	Weu, Oct 10	Wienale	of motor system		
4 th	Tue. Oct 22 th	Menale	Elements of renal functions. Glomerular filtration and		
October 21 rd -25 th	,		autoregulation. Renal Clearance. Tubular functions.		
2024	Wed, Oct 23 th	Menale			
5 th					
October 28 th -	Tue, Oct 29 th	Menale	Blood, hemoreology and hemodynamics.		
November 1 st					
2024 (Nov 1 st holiday)					
	Tue. Nov 5 th	Menale			
6 th			Hemostasis and Blood Coagulation. Bone cells and		
November 4 th -8 th ,	Wed, Nov 6 th	Menale	metabolism		
2024					
			Electrical activity of the heart. Nodal tissues and Venticular		
7 th	Tue, Nov 12th	Menale	myocytes. Electrocardiography.		
November 11 th -15 th ,			The cardiac pump. Cardiac chambers and valves. Cardiac		
2024	Wed, Nov 13 th	Menale	output and its regulation.		
		Diano			

8 th November 18 th -22 th ,	Tue, Nov 19th	Diano	Peripheral circulation: Arterial and venous system and thier control. Blood pressure and its control
2024	Wed, Nov 20 th	Diano	
9 th	Tue, Nov 26th	Diano	Microcirculation and its control. Lymphatics. Pulumary circulation and perfusion.
November 25 th -29 th , 2024	Wed Nov 27th	Diano	
10 th December2nd- 6th, 2024	Tue, Dec 3rd Wed, Dec 4th	Diano Diano	Solutes secretion and absorption. Henle's loop. Distal tubule and collecting duct. Control of body fluids, osmolality and volumes. Regualtion of acid-base balance by the kidney
11 th December 9 th -13 th , 2024	Tue, Dec 10 th	Diano	The respiratory system: structure and functions. Pulmunary ventilation.
	Wed, Dec 11 th	Diano	

READINGS/BIBLIOGRAPHY

1)Berne &Levy Physiology, 6th Updated Edition by Bruce M. Koeppen, Bruce A. Stanton Elsevier 2)Medical Physiology, 3rd Edition by Walter F. Boron (Autore), Emile L. Boulpaep Elsevier

TEACHING METHODS

Teachers will use: a) lectures with powerpoint slide projections for approx. 65% of total hours (5 CFU); b) interactive learning activities for approx. 40% of total hours (3 CFU).

EXAMINATION/EVALUATION CRITERIA

a) Examtype:

Examtype	
writtenandoral	
onlywritten	
onlyoral	Х
project discussion	
other	