COURSE DETAILS

"HUMAN PHYSIOLOGY I"

SSD BIO/09

DEGREE PROGRAMME:MEDICINE AND SURGERY (P11)

ACADEMIC YEAR 2025-2026

GENERAL INFORMATION–TEACHER REFERENCES

COORDINATOR : SABRINA DIANO
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Faculty	Position	Scientific Fields:	Phone 746-	Reception (day/time/building)	E-mail
Sabrina Diano	Full Professor	Physiology	3331	Wed. 14.00 – 16.00 Bldg 19, 9th floor	sabrina.diano@unina.it
Monica Dentice	Associate Professor	Physiology	3636	Wed. 11.00 – 13.00 Bldg 19, 9th floor	monica.dentice@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 13.00-15,30**	**Prof**	**Formal Lectures**
1st October1st-3th, 2025	Wed, Oct 1st Thur, Oct 2nd Fri, Oct 3rd (1.00 pm – 5.00 pm)	Dentice Dentice Dentice	Cellular membranes and transmembrane transports of solutes and water. Principles of Electrophysiology. Synaptic communication. Neurosecretion.
2nd October6th-10th, 2025	Tue, Oct 7th Wed, Oct 8th	Dentice Dentice	Neurotransmitters. Synaptic integration and inhibition. Temporal and spatial summation.
3rd October13th-17th, 2025	Tue, Oct 14th Wed, Oct 15th	Dentice Dentice	Neuromuscular junction, Autonomic Nervous system. Skeletal Muscle. Muscle contraction.
4th October 20rd-24th 2025	Tue, Oct 21st Wed, Oct 22nd	Dentice Dentice	Functional organization of motor system. Elements of renal functions. Glomerular filtration and autoregulation.
5th October 27th- October 31st 2025	Tue, Oct 28th Wed, Oct 29th	Dentice Dentice	Renal Clearance. Tubular functions. Blood, hemoreology and hemodynamics.
6th November 3rd-7th, 2025	Tue, Nov 4th Wed, Nov 5th	Dentice Dentice	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
7th November 10th-14th,	Tue, Nov 11th Wed, Nov 12th	Dentice/Diano Diano	Hemostasis and Blood Coagulation. Bone cells and metabolism. Electrical activity of the heart. Nodal tissues

2025	Fri, Nov 14th	Diano	and Venticular myocytes. Electrocardiography.
8th November 17th-21th, 2025	Mon, Nov 17th Tue, Nov 18th Wed, Nov 19th Thur, Nov 20th Fri, Nov 21st	Diano Diano Diano Diano Diano	The cardiac pump. Cardiac chambers and valves. Cardiac output and its regulation.
9th November 24th-28th, 2025	Mon, Nov 24th Tue, Nov 25th Wed, Nov 26th Thur, Nov 27th Fri, Nov 28th	Diano Diano Diano Diano Diano	Peripheral circulation: Arterial and venous system and their control. Blood pressure and its control. Microcirculation and its control. Lymphatics.
10th December 1st- 5th, 2025	Mon, Dec 1st Tue, Dec 2nd Wed, Dec 3rd Thur, Dec 4th Fri, Dec 5th	Diano Diano Diano Diano Diano	Pulumary circulation and perfusion. Mechanical respiration.
11th December 8th-12th, 2025	Tue, Dec 9th Wed, Dec 10th Thur, Dec 11th Fri, Dec 12th	Diano Diano Diano Diano	The respiratory system: structure and functions. Pulmunary ventilation.

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	X
project discussion	
other	