



# UNIVERSITÀ DEGLI STUDI DI PALERMO

<b>DEPARTMENT</b>	Ingegneria
<b>ACADEMIC YEAR</b>	2023/2024
<b>BACHELOR'S DEGREE (BSC)</b>	BIOMEDICAL ENGINEERING
<b>INTEGRATED COURSE</b>	ELEMENTS OF ANATOMY AND PHYSIOLOGY
<b>CODE</b>	11077
<b>MODULES</b>	Yes
<b>NUMBER OF MODULES</b>	2
<b>SCIENTIFIC SECTOR(S)</b>	BIO/16, BIO/09
<b>HEAD PROFESSOR(S)</b>	SERIO ROSA MARIA      Professore Ordinario      Univ. di PALERMO
<b>OTHER PROFESSOR(S)</b>	BUCCHIERI FABIO      Professore Ordinario      Univ. di PALERMO SERIO ROSA MARIA      Professore Ordinario      Univ. di PALERMO
<b>CREDITS</b>	9
<b>PROPAEDEUTICAL SUBJECTS</b>	
<b>MUTUALIZATION</b>	
<b>YEAR</b>	2
<b>TERM (SEMESTER)</b>	Annual
<b>ATTENDANCE</b>	Not mandatory
<b>EVALUATION</b>	Out of 30
<b>TEACHER OFFICE HOURS</b>	<b>BUCCHIERI FABIO</b> Monday 08:00 10:00 Si riceve soltanto con prenotazione tramite email Wednesday 08:00 10:00 Si riceve soltanto con prenotazione tramite email <b>SERIO ROSA MARIA</b> Tuesday 09:00 12:00 Studio Pt 072 Dipartimento STEBICEF. Ed. 16. Primo piano

**DOCENTE:** Prof.ssa ROSA MARIA SERIO

<b>PREREQUISITES</b>	Basic knowledge of cell biology and biochemistry
<b>LEARNING OUTCOMES</b>	<p>Knowledge and understanding Acquisition of knowledge concerning the general structure of tissues and the morphological and functional characteristics of the different human systems.</p> <p>Applying knowledge and understanding Ability to establish the correlation between structure and function at the basis of the mechanisms that allow the maintenance of the homeostasis of the cells and the organism.</p> <p>Making judgments To make critically own skill judgment on the scientific issues proposed in classroom.</p> <p>Communication skills Ability to use the correct terminology of the disciplines.</p> <p>learning skills Ability to deepen the topics covered in classroom in a largely autonomous manner, using own cultural heritage and / or scientific sources</p>
<b>ASSESSMENT METHODS</b>	<p>The final test consists of an oral examination. Student will be tested on one/two topics per module. The final mark will be calculated by the weighted average of the marks obtained in the module examinations, taking into account the number of credits assigned to each part. Final assessment aims to evaluate whether the Student has knowledge and understanding of the subjects, properties of language and is able to apply their knowledge to meet the object of the evaluation question. The assessment is carried out of 30 and the marks go from sufficient (18/30) to excellent (30/30 cum laude).</p> <p>The pass mark (18-20/30) will be reached when the student will have shown a minimal acceptable knowledge and understanding of the topics and presentation skills, but minimal ability to independently apply the knowledge gained. The demonstration of a greater knowledge of the topics together with a higher language skills and application of acquisitive knowledge will be proportionally evaluated more positively.</p> <p>The exam will be considered satisfactory (21-23/30) if the student demonstrates a basic knowledge of the subjects with language properties, but still poor ability to independently apply the knowledge gained.</p> <p>The exam will be considered good (24-26/30) if the student has a good command of the topics, good language skills, but still needs to be guided to apply the knowledge gained.</p> <p>The exam will be considered very good (27-29/30) if the student has a good command of the topics, very good language skills, and is able to independently apply the knowledge gained.</p> <p>The exam will be considered excellent (30-30 cum laude) if the student has an excellent knowledge of the topics, excellent language skills, and is able to independently apply the knowledge gained.</p>
<b>TEACHING METHODS</b>	In class lectures

**MODULE  
PRINCIPLES OF ANATOMY**

*Prof. FABIO BUCCHIERI*

**SUGGESTED BIBLIOGRAPHY**

Fondamenti di Anatomia e Fisiologia  
F. H. Martini, J. L. Nath, E. F. Bartholomew  
EdiSES  
ISBN 9788833190532

Fundamentals of Anatomy & Physiology 11th edition  
Frederic H. Martini, Judi L. Nath and Edwin F. Bartholomew  
Pearson  
ISBN 9781292229867

<b>AMBIT</b>	10657-Attività formative affini o integrative
<b>INDIVIDUAL STUDY (Hrs)</b>	54
<b>COURSE ACTIVITY (Hrs)</b>	21

**EDUCATIONAL OBJECTIVES OF THE MODULE**

The module of Histology and Anatomy aims to offer:  
-understanding of the main structural components of the human body at the tissue and organ level;  
-knowledge of the different systems of the human body and understanding of the morphofunctional relationships between the organs they are composed of;  
-acquisition of an overall view of the human body that integrates organs and systems, and, in particular, understanding of the anatomical systems involved in the locomotor, cardiovascular, renal and respiratory system functions, and the neural mechanisms controlling them.

**SYLLABUS**

Hrs	Frontal teaching
1	Introduction. Introduction to the systems of the human body and its organization; Anatomical terminology.
3	Basics of cytology. Histology (Epithelial, connective, muscle and nervous tissue)
4	Locomotor system. Bone structure (histological organization; compact and cancellous bone; periosteum and endosteum); Intramembranous and endochondral ossification; Bone classification; Axial and appendicular skeleton; Joints; Muscle contraction; Overview of the axial and appendicular muscles.
3	Cardiovascular system. Heart (pericardium; heart wall; internal anatomy of the heart; vascularization; cardiac cycle; cardiac conduction system); Blood vessels and circulation [Histological organization of blood vessels (arteries, veins and capillaries)]; Systemic and pulmonary circulation.
2	Respiratory system. Upper and lower airways; Trachea; Bronchial tree; Lungs; Pleurae; Respiratory muscles and pulmonary ventilation.
2	Urinary system. Kidneys (macroscopic anatomy; microscopic anatomy; vascularization; function); Ureters; Bladder; Urethra.
2	Overview of the digestive system.
4	Nervous system. Brain and cranial nerves (main features of the telencephalon, diencephalon, midbrain, pons, cerebellum and medulla); Spinal cord and nerves; Autonomic nervous system; General and special senses.

## MODULE PHYSIOLOGY

*Prof.ssa ROSA MARIA SERIO*

### SUGGESTED BIBLIOGRAPHY

FONDAMENTI DI ANATOMIA E FISIOLOGIA - Martini, Nath, Bartholomew - EDISES Edizione:IV 2019 ISBN: 9788833190532

FISIOLOGIA UMANA. UN APPROCCIO INTEGRATO - Silverthorn . PEARSON EDUCATION Edizione VIII 2020 - ISBN: 9788891909732

FUNDAMENTALS OF ANATOMY & PHYSIOLOGY - Martini, Nath, Bartholomew - Global Edition 11/E 2018 \_ ISBN: 9781292229867

<b>AMBIT</b>	10657-Attività formative affini o integrative
<b>INDIVIDUAL STUDY (Hrs)</b>	108
<b>COURSE ACTIVITY (Hrs)</b>	42

### EDUCATIONAL OBJECTIVES OF THE MODULE

This course will teach the fundamentals of human physiology with a specific focus on the nervous, cardiovascular, respiratory, and urinary systems. Basic introductory engineering principles will be applied to the study of physiological systems.

## SYLLABUS

Hrs	Frontal teaching
6	<b>GENERAL CONCEPTS AND PRINCIPLES OF PHYSIOLOGY</b> The regulation in the vital processes – The internal environment and its stability. The concept of homeostasis. Principles and homeostatic mechanisms - Integration systems (neural, endocrine and neuroendocrine messages). Exchanges between the cell and the environment. The membrane transports.
4	<b>ELECTRIC PROPERTIES OF PLASMA MEMBRANE AND PHYSIOLOGY OF NEURONS</b> Resting membrane potential. Ionic basis of resting membrane potential. Action potential: properties and ionic basis. Conduction of the Action Potential along the Nerve Fiber.
8	<b>CELL COMMUNICATION</b> Chemical messengers and cellular responses - Local messengers - Hormones - Synaptic transmission. electrical and chemical synapses The neuromuscular transmission. Postsynaptic events. Mechanisms of Neurotransmitter Release. Synapses between neurons. Synaptic integration. Neurotransmitters. The sensory receptors. The reflex responses.
5	<b>NERVOUS SYSTEM</b>  The Functional organization of the Central Nervous System. Neurons and glial cells: structure and function. Interaction between neurons: neural networks . Electroencephalogram. Functional organization of the peripheral nervous system.
4	<b>MUSCULAR SYSTEM</b> Skeletal Muscle. Molecular Mechanisms of skeletal muscle contraction. Whole-Muscle Contraction. Smooth and cardiac muscle.
5	<b>CARDIOVASCULAR SYSTEM</b> Structure and functions of the heart and circulatory system in vertebrates. Circulating body fluids: their composition and functions of plasma and blood cells. The heart as a pump . the Cardiac Cycle. The cardiac output and its regulation. Blood vessels and circulation: Hemodynamics: Physical Determinants of Blood Flow. Pressure & Flow in Arteries, Veins, and Capillaries. Diffusion Across the Capillary Wall: Exchanges of Nutrients and Metabolic End Products
4	<b>RESPIRATORY SYSTEM</b> Respiratory physiology: general principles, structure and functions of air passages and respiratory surfaces. Ventilation and gas Exchange Between Alveoli and Blood. Gas transport between the lungs and tissues. Gas Exchange Between Tissues and Blood.
2	<b>DIGESTIVE SYSTEM</b> Introduction to the digestive system. Mechanical and chemical digestion. Intestinal absorption.
4	<b>RENAL SYSTEM</b> Osmolarity and osmotic pressure. Osmolarity vs tonicity. Osmosis. Body Fluid Compartments. Structure of the Kidneys and Urinary System. Basic Renal Processes: Glomerular ultrafiltration, reabsorption, secretion, excretion. Fluid and Electrolyte Balance. Micturation reflex