



# UNIVERSITÀ DEGLI STUDI DI PALERMO

<b>DEPARTMENT</b>	Ingegneria
<b>ACADEMIC YEAR</b>	2022/2023
<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>	TERZO SIMONA      Ricercatore a tempo determinato      Univ. di PALERMO
<b>OTHER PROFESSOR(S)</b>	CAPPELLO FRANCESCO      Professore Ordinario      Univ. di PALERMO
	TERZO SIMONA      Ricercatore a tempo determinato      Univ. di PALERMO
<b>CREDITS</b>	9
<b>PROPAEDEUTICAL SUBJECTS</b>	
<b>MUTUALIZATION</b>	
<b>YEAR</b>	2
<b>TERM (SEMESTER)</b>	1° semester
<b>ATTENDANCE</b>	Not mandatory
<b>EVALUATION</b>	Out of 30
<b>TEACHER OFFICE HOURS</b>	<p><b>CAPPELLO FRANCESCO</b></p> <p>Monday    10:00    12:00    Plesso di Anatomia Umana ed Istologia, Dipartimento di Biomedicine, Neuroscienze e Diagnostica Avanzata.</p> <p>Wednesday 10:00    12:00    Plesso di Anatomia Umana ed Istologia, Dipartimento di Biomedicine, Neuroscienze e Diagnostica Avanzata.</p> <p><b>TERZO SIMONA</b></p> <p>Friday      10:00    12:00    Studio personale presso Dipartimento STEBICEF, Edificio 16 -II piano- viale delle Scienze. E' preferibile concordare appuntamento per e-mail: simona.terzo01@unipa.it</p>

**DOCENTE:** Prof.ssa SIMONA TERZO

<b>PREREQUISITES</b>	Basic knowledge of cell biology and biochemistry
<b>LEARNING OUTCOMES</b>	<p>Knowledge and understanding</p> <p>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</p> <p>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</p> <p>To make critically own skill judgment on the scientific issues proposed in classroom.</p> <p>Communication skills</p> <p>Ability to use the correct terminology of the disciplines.</p> <p>learning skills</p> <p>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 at least two topics per module.</p> <p>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 questions. 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. The pass mark will be reached when the student will have shown an 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 assessment is carried out of 30 and the marks go from sufficient (18/30) to excellent (30/30 cum laude), according to the following criteria:</p> <p>Indicator - Knowledge and competence of contents Descriptor and score range:</p> <p>Excellent 10</p> <p>Autonomous and effective 8-9 Acceptable 6-7</p> <p>Fragmentary or partly superficial 4-5</p> <p>Inadequate 0-3</p> <p>Indicator - Applicative skill, precision, logical-thematic coherence Descriptor and score range:</p> <p>Excellent 10</p> <p>Adequate 8-9</p> <p>Acceptable also if partly driven 6-7</p> <p>Limited 4-5</p> <p>Inadequate 0-3</p> <p>Indicator - Expression and terminology, reprocessing skills and multi-disciplinary connections</p> <p>Descriptor and score range:</p> <p>Excellent 10</p> <p>Effective and well-structured 8-9</p> <p>Generally satisfactory 6-7</p> <p>Hesitant and rough 4-5</p> <p>Inadequate 0-3</p>
<b>TEACHING METHODS</b>	In class lectures

## MODULE PRINCIPLES OF ANATOMY

*Prof. FRANCESCO CAPPELLO*

### SUGGESTED BIBLIOGRAPHY

Anatomia Umana. Martini, Cocco, Zummo

ISBN-10 : 8833190250

ISBN-13 : 978-8833190259

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Human Anatomy, Global Edition (Inglese) Copertina flessibile – 1 gen 2020

di Martini Frederic (Autore), Timmons Michael (Autore)

ISBN-10 : 0321688155

ISBN-13 : 978-0321688156

<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 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 SIMONA TERZO*

### SUGGESTED BIBLIOGRAPHY

FISIOLOGIA UMANA. UN APPROCCIO INTEGRATO - Silverthorn. ISBN 8891909734

HUMAN PHYSIOLOGY. AN INTEGRATED APPROACH - Silverthorn. ISBN 9780134605197

<b>AMBIT</b>	10657-Attività formative affini o integrative
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<b>INDIVIDUAL STUDY (Hrs)</b>	108
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<b>COURSE ACTIVITY (Hrs)</b>	42
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### EDUCATIONAL OBJECTIVES OF THE MODULE

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

## SYLLABUS

Hrs	Frontal teaching
4	GENERAL CONCEPTS AND PRINCIPLES OF PHYSIOLOGY 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.
5	ELECTRIC PROPERTIES OF PLASMA MEMBRANE AND PHYSIOLOGY OF NEURONS Resting membrane potential. Ionic basis of resting membrane potential. The equivalent circuit. Action potential: properties and ionic basis. Conduction of the Action Potential along the Nerve Fiber.
5	CELL COMMUNICATION 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.
7	NERVOUS SYSTEM  The Functional organization of the Central Nervous System. Neurons and glial cells: structure and function. Interaction between neurons: neural networks. Functional organization of movement and perception and their putative computational models. Principles of Electroencephalography (EEG) and Evoked potentials (EPs). Functional organization of the peripheral nervous system. Electromyography (EMG)
4	MUSCULAR SYSTEM Skeletal Muscle. Molecular Mechanisms of skeletal muscle contraction. Whole-Muscle Contraction. Smooth and cardiac muscle.
5	CARDIOVASCULAR SYSTEM Structure and functions of the heart and circulatory system in vertebrates. Circulating body fluids: their composition and functions of plasma and blood cells. Electrical and mechanical properties of the heart . the Cardiac Cycle. The cardiac output and its regulation. Principles of Electrocardiography (EKG). 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	RESPIRATORY SYSTEM 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	DIGESTIVE SYSTEM Introduction to the digestive system. Mechanical and chemical digestion. Intestinal absorption.
4	RENAL SYSTEM 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. Micturition reflex
2	ENDOCRINE SYSTEM. Hormones. General principles of endocrine glands physiology and feedback control.