



UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Ingegneria
ACADEMIC YEAR	2023/2024
BACHELOR'S DEGREE (BSC)	BIOMEDICAL ENGINEERING
INTEGRATED COURSE	ELEMENTS OF ANATOMY AND PHYSIOLOGY
CODE	11077
MODULES	Yes
NUMBER OF MODULES	2
SCIENTIFIC SECTOR(S)	BIO/16, BIO/09
HEAD PROFESSOR(S)	TERZO SIMONA Ricercatore a tempo determinato Univ. di PALERMO
OTHER PROFESSOR(S)	CAPPELLO FRANCESCO Professore Ordinario Univ. di PALERMO
	TERZO SIMONA Ricercatore a tempo determinato Univ. di PALERMO
CREDITS	9
PROPAEDEUTICAL SUBJECTS	
MUTUALIZATION	
YEAR	2
TERM (SEMESTER)	Annual
ATTENDANCE	Not mandatory
EVALUATION	Out of 30
TEACHER OFFICE HOURS	<p>CAPPELLO FRANCESCO</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>TERZO SIMONA</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

PREREQUISITES	Basic notions of Cell Biology and Biochemistry
LEARNING OUTCOMES	<p>Knowledge and understanding.</p> <p>Understanding of the general structure of fabrics and characteristics essential morphofunctional functions of the different systems.</p> <p>Ability to apply knowledge and understanding.</p> <p>Ability to establish the correlation between structure and function underlying the mechanisms that allow the maintenance of cell homeostasis e of the organism.</p> <p>Judgment autonomy.</p> <p>Be able to make personal judgments about specific topics presented e discussed in class.</p> <p>Communication skills.</p> <p>Ability to use the specific language of the disciplines.</p> <p>Learning ability.</p> <p>Ability to autonomously deepen the topics covered by making use of the own cultural background and/or scientific sources</p>
ASSESSMENT METHODS	<p>The carrying out of the final test consists of the oral answer to at least two questions per form.</p> <p>The final test aims to assess whether the student has knowledge and understanding of topics, and language properties and is able to apply the acquired knowledge to answer the questions covered by the assessment. The final evaluation of the integrated course expressed out of thirty, it will be made up of the average obtained from the evaluation of each module, weighted with the relative number of credits. The threshold of sufficiency will be reached when the Student will have shown sufficient knowledge and understanding of the arguments and presentation skills, but minimal ability to apply the acquired knowledge independently. Below, the exam will result insufficient. The demonstration of increasing knowledge of the topics together with the greater capacity 'exposition and application of acquired knowledge will be evaluated more and more positively up to the judgment maximum of thirty cum laude, according to the following criteria:</p> <p>Indicator - Knowledge and mastery of disciplinary content Descriptors e grade range:</p> <p>Excellent 10</p> <p>Autonomous and effective 8-9</p> <p>Acceptable 6-7</p> <p>Fragmentary or partly approximate 4-5</p> <p>Inadequate 0-3</p> <p>Indicator - Ability to apply, rigour, logical-thematic coherence Descriptors and grade range:</p> <p>Excellent 10</p> <p>Definitely adequate 8-9</p> <p>Acceptable even if partially driven 6-7</p> <p>Limited 4-5</p> <p>Inadequate 0-3</p> <p>Indicator - Expression and terminology, ability to re-elaborate and multidisciplinary link Descriptors and grade range:</p> <p>Excellent 10</p> <p>Effective and articulated 8-9</p> <p>Overall satisfactory 6-7</p> <p>Hesitant and approximate 4-5</p> <p>Inadequate 0-3</p>
TEACHING METHODS	frontal lessons

MODULE ANATOMY

Prof. FRANCESCO CAPPELLO

SUGGESTED BIBLIOGRAPHY

Anatomia Umana. Martini, Cocco, Zummo

ISBN-10 : 8833190250

ISBN-13 : 978-8833190259

e,

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

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

ISBN-10 : 0321688155

ISBN-13 : 978-0321688156

AMBIT	10657-Attività formative affini o integrative
INDIVIDUAL STUDY (Hrs)	54
COURSE ACTIVITY (Hrs)	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

AMBIT	10657-Attività formative affini o integrative
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INDIVIDUAL STUDY (Hrs)	108
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COURSE ACTIVITY (Hrs)	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.