



# UNIVERSITÀ DEGLI STUDI DI PALERMO

<b>DEPARTMENT</b>	Biomedicina, Neuroscienze e Diagnostica avanzata		
<b>ACADEMIC YEAR</b>	2016/2017		
<b>MASTER'S DEGREE (MSC)</b>	MEDICINE AND SURGERY		
<b>INTEGRATED COURSE</b>	HUMAN PHYSIOLOGY - INTEGRATED COURSE		
<b>CODE</b>	03380		
<b>MODULES</b>	Yes		
<b>NUMBER OF MODULES</b>	3		
<b>SCIENTIFIC SECTOR(S)</b>	BIO/09		
<b>HEAD PROFESSOR(S)</b>	CRESCIMANNO GIUSEPPE	Professore Ordinario	Univ. di PALERMO
	BELLUARDO NATALE	Professore Ordinario	Univ. di PALERMO
	MORICI GIUSEPPE	Professore Associato	Univ. di PALERMO
<b>OTHER PROFESSOR(S)</b>	GIGLIA GIUSEPPE	Professore Associato	Univ. di PALERMO
	MUDO' GIUSEPPA	Professore Ordinario	Univ. di PALERMO
	CRESCIMANNO GIUSEPPE	Professore Ordinario	Univ. di PALERMO
	MORICI GIUSEPPE	Professore Associato	Univ. di PALERMO
	BELLUARDO NATALE	Professore Ordinario	Univ. di PALERMO
	SARDO PIERANGELO	Professore Ordinario	Univ. di PALERMO
	FERRARO GIUSEPPE	Professore Ordinario	Univ. di PALERMO
<b>CREDITS</b>	17		
<b>PROPAEDEUTICAL SUBJECTS</b>	17447 - CHEMISTRY AND BIOCHEMISTRY - INTEGRATED COURSE 17445 - HUMAN ANATOMY II - INTEGRATED COURSE 17708 - HUMAN ANATOMY I 01617 - BIOLOGY AND GENETICS - INTEGRATED COURSE		
<b>MUTUALIZATION</b>			
<b>YEAR</b>	2		
<b>TERM (SEMESTER)</b>	Annual		
<b>ATTENDANCE</b>	Mandatory		
<b>EVALUATION</b>	Out of 30		
<b>TEACHER OFFICE HOURS</b>	<p><b>BELLUARDO NATALE</b> Monday 15:00 18:00 Dipartimento BIONEC sezione FisiologiaCorso Tukory 129 Tuesday 15:00 18:00 Dipartimento BIONEC sezione FisiologiaCorso Tukory 129 Wednesday 15:00 18:00 Dipartimento BIONEC sezione FisiologiaCorso Tukory 129 Thursday 15:00 18:00 Dipartimento BIONEC sezione Fisiologia Corso Tukory 129</p> <p><b>CRESCIMANNO GIUSEPPE</b> Monday 08:30 11:30 Per appuntamento in Fisiologia Umana, Corso Tukory 129 Wednesday 08:30 11:30 Per appuntamento in Fisiologia Umana, Corso Tukory 129</p> <p><b>FERRARO GIUSEPPE</b> Tuesday 11:00 13:00 Sezione di Fisiologia umana del Dipartimento BIONECC.so Tukory, 129Palermo Thursday 11:00 13:00 Sezione di Fisiologia umana del Dipartimento BIONECC.so Tukory, 129Palermo</p> <p><b>GIGLIA GIUSEPPE</b> Tuesday 16:40 18:40 Campus Universitario - Padiglione 11 CEPAS, via G. Mule,1 Caltanissetta Thursday 16:40 18:40 Campus Universitario - Padiglione 11 CEPAS, via G. Mule,1 Caltanissetta</p>		

	<p><b>MORICI GIUSEPPE</b> Thursday 11:00 13:00 Per l'appuntamento chiamare al 3392514805 - Dipartimento di Biomedicina Sperimentale e Neuroscienze Cliniche (Fisiologia Umana) Università di Palermo Corso Tukory 129, Palermo</p> <p><b>MUDO' GIUSEPPA</b> Monday 00:00 00:01 Previo accordo</p> <p><b>SARDO PIERANGELO</b> Monday 09:30 10:30 BiND- Sezione di Fisiologia umana - Corso Tukory, 129 - II piano Friday 09:30 10:30 BiND- Sezione di Fisiologia umana - Corso Tukory, 129 - II piano</p>
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**DOCENTE:** Prof. GIUSEPPE CRESCIMANNO- Sede *CHIRONE*

<b>PREREQUISITES</b>	Knowledges of Chemistry, Physics, Biochemistry, Anatomy
<b>LEARNING OUTCOMES</b>	<p>Students will mature understanding of the main operating mechanisms of organs and systems while developing the ability 'to organize an integrated view of the main functions of the body.</p> <p>Capacity 'to apply knowledge and understanding Students will acquire the ability 'to organize an integrated view of the main functions of the body as the basis for advancement in the study of pathophysiological mechanisms of major diseases. Students will also gain the ability 'to be applied in medical practice the knowledge gained on the functioning of the organs and understand the possible functional adaptations.</p> <p>Making judgments Limited to the main physiological parameters to be able to assess the deviation from the norm</p> <p>Enable 'communication Capacity 'to expose the concepts in a clear and comprehensive developing the ability' to communicate and disseminate clearly the knowledge acquired during the course independently explaining the possible applications in the medical fields.</p> <p>Capacity 'Learning Ability 'to update the correctness of self-concepts learned during the course of Human Physiology and ability' to integrate them with those of preparatory teachings. Students will also have the ability to mature 'to continue and deepen their studies using the knowledge gained from the study of Human Physiology</p>
<b>ASSESSMENT METHODS</b>	<p>Learnig evaluation will be carried out by means of oral examination. Learning evaluation will take place 'through oral examination. The candidate will have to answer at least two / three questions posed orally, on all parties covered by the program, with reference to the recommended texts.</p> <p>Final assessment aims to evaluate whether the student has knowledge and understanding of the topics, has acquired jurisdiction to interpret and independent judgment of concrete cases.</p> <p>The pass mark will be reached when the student shows knowledge and understanding of the subjects at least in general terms, and has minimal application skills (to be defined!) In order to solve concrete cases; It will also have presentation skills and argumentative as to allow the transmission of his knowledge to the examiner. Below this threshold, the examination will be insufficient. The more, however, the examinee with its argumentative and presentation skills can interact with the examiner, and the more his knowledge and application capabilities go into detail the discipline of verification, the more the assessment is positive.</p> <p>The assessment is carried out of thirty.</p>
<b>TEACHING METHODS</b>	Frontal lessons integrated with exercitations

**DOCENTE:** Prof. GIUSEPPE MORICI- Sede HYPATIA

<b>PREREQUISITES</b>	Knowledges of Chemistry, Physics, Biochemistry, Anatomy
<b>LEARNING OUTCOMES</b>	<p>Students will mature understanding of the main operating mechanisms of organs and systems while developing the ability to organize an integrated view of the main functions of the body.</p> <p>Capacity to apply knowledge and understanding. Students will acquire the ability to organize an integrated view of the main functions of the body as the basis for advancement in the study of pathophysiological mechanisms of major diseases. Students will also gain the ability to be applied in medical practice the knowledge gained on the functioning of the organs and understand the possible functional adaptations.</p>
<b>ASSESSMENT METHODS</b>	<p>For current students will be organised a non-compulsory mid-term assessment limited to the first module. This mid-test assessment shall consist of a written test. The assessment is carried out of thirty. Final learning evaluation will be carried out by means of oral examination. Learning evaluation will take place through oral examination. The candidate will have to answer at least to two / three questions posed orally, on all parties covered by the program, with reference to the recommended texts. Final assessment aims to evaluate whether the student has knowledge and understanding of the topics, has acquired jurisdiction to interpret and independent judgment of concrete cases. The pass mark will be reached when the student shows knowledge and understanding of the subjects at least in general terms, and has minimal application skills in order to solve concrete cases. He should also have presentation skills and argumentative as to allow the transmission of his knowledge to the examiner. Below this threshold, the examination will be insufficient. The more, however, the student with his argumentative and presentation skills can interact with the examiner, and the more his knowledge and application capabilities go into detail the discipline of verification, the more the assessment is positive. The assessment is carried out of thirty.</p>
<b>TEACHING METHODS</b>	Frontal lessons

**DOCENTE:** Prof. NATALE BELLUARDO- Sede IPPOCRATE

<b>PREREQUISITES</b>	Basic knowledge of cell biology, anatomy and cell - tissue peculiarities of the organs . Knowledge of the principles of biophysics and biochemistry useful to the understanding of organ physiology.
<b>LEARNING OUTCOMES</b>	<p>Knowledge and ability to understand At the end of the course students will develop the knowledge of the functioning of every organ and system and the ability to analyze and solve problems related to mechanisms of organ functional regulation in different conditions of working stress. They will have knowledge of the integrated functioning of organs and the control role played by the nervous, endocrine and humoral systems on the various organs. Students will have knowledge of CNS functions including cognitive processes , learning and execution of specific tasks, behaviors and emotional responses. Will know and understand the main physiological parameters of human healthy.</p> <p>Capacity to apply knowledge and understanding Students will use the knowledge acquired during the course of Human Physiology directly as a basis for advancement in the study of pathophysiological mechanisms and clinical and instrumental characteristics of various diseases . They will know how to apply the knowledge in the interpretation of adaptive processes in physiological conditions and disease. Students will acquire knowledge and skills in various health needs and ability to develop and support reasoning to solve problems in new areas or inserted in interdisciplinary contexts.</p> <p>Evaluation autonomy Students will be able to use the knowledge provided by the course in a rational and autonomous way. Students will be able to apply their knowledge to issues related to organs and systems functioning. Students will manage the functional interactions between organs with logical approach..</p> <p>communication skills Students will develop skills to communicate with clarity and propriety of language the knowledge acquired during the course.</p> <p>Learning ability Ability to deepen the basic knowledge learned in the course and to upgrade it by consulting the scientific publications and other network resources.</p>
<b>ASSESSMENT METHODS</b>	<p>The oral examination will consist in a discussion on the topics listed in this schedule . The exam will be mainly aimed to verify: the degree of knowledge acquired on the organs functioning; the capacity to understand the integrated functioning of the organs; the know of compensatory responses of organ or system to functional and environmental stress. Will be also evaluated the clarity of topic presentation, the ability to deepen the topics and acquisition of technical language of discipline.</p> <p>The assessment of the oral examination is expressed in thirtieths.</p>
<b>TEACHING METHODS</b>	Frontal teaching.

**MODULE  
MODULE II**

*Prof. GIUSEPPE CRESCIMANNO - Sede CHIRONE, - Sede CHIRONE*

**SUGGESTED BIBLIOGRAPHY**

Fisiologia Umana a cura di F. Grassi e altri. Poletto Editore 2015  
 Fisiologia. Di R.M. Berne, M.N. Levy, B.M. Koeppen, B.A. Stanton. Casa Editrice Ambrosiana  
 Fisiologia Medica. A cura di F. Conti – Edi-Ermes  
 Fisiologia Umana. Di Schmidt, Lang, Thews. Idelson-Gnocchi

<b>AMBIT</b>	50422-Funzioni biologiche integrate di organi, sistemi e apparati umani
<b>INDIVIDUAL STUDY (Hrs)</b>	90
<b>COURSE ACTIVITY (Hrs)</b>	60
<b>EDUCATIONAL OBJECTIVES OF THE MODULE</b>	
Knowing the functions of the central nervous system, peripheral and vegetative	

**SYLLABUS**

Hrs	Frontal teaching
60	<p>60 HOURS FRONT ACTIVITIES 'TEACHING FRONT - SCHEDULE 1 Indicate in general terms the morpho-functional organization of the central nervous system, peripheral and vegetative 4Descrivere the activities' of the autonomic nervous system: ortho-sympathetic and parasympathetic component 1 Indicate the functions of glia 8 Describe the elementary interactions between neurons: synaptic transmission and its modulation of synaptic integration mechanisms, release of neurotransmitters and their interaction with the different classes of receptors. Manipulation of synaptic transmission. gas transmission of nerve signals. The neuropeptides. 2 Define the concept of plasticity 'synaptic, indicate major neurotrophic factors and synthesize neuro-physiological processes of aging and cell death 2 Explain neuro-physiological aging and cell death. Wallerian degeneration. 5 Explain the physiological mechanisms of sensitivity 'somatic (tactile, thermal, to pain, proprioceptive) and visceral 5 Indicate in its major components the organization of the motor system 6 Explain the mechanisms of spinal motor coordination: reflex action, the role of interneurons 4 Muscle tone and its regulation 4 Posture: brainstem mechanisms; postural reflexes; vestibular apparatus and tonic labyrinthine reflexes and neck. Locomotion 2 Illustrate from the point of view of the structural and functional organization of voluntary movement: the relationship between anatomical structures (cortical areas, the cortico-spinal) and motor functions 2 Describe in general the functional characteristics of the motor control systems 2 Describe the functional characteristics cerebellar circuits involved in the control of the attivita 'motor 3 Describe the functional characteristics of the circuits of the nuclei involved in the basic control of the attivita' motor 1 ocular motility 3 Explain the anatomical and functional organization of the cerebral cortex. Correlate the electrophysiological principles with the most 'common physiological and pathological results electroencephalogram 2 Describe the anatomical and functional aspects of the limbic system 3 Explain the anatomical and functional basis of higher nervous functions: sleep, language, memory</p>

**MODULE  
MODULE I**

*Prof. GIUSEPPE FERRARO - Sede CHIRONE, - Sede CHIRONE*

**SUGGESTED BIBLIOGRAPHY**

Fisiologia umana, a cura di Grassi- Negrini- Porro. Poletto Editore  
Fisiologia Medica, a cura di F. Conti. Edi-Ermes  
Neuroscienze- D. Purves. Zanichelli  
Consultazione:Principi di Neuroscienze - E. Kandel. Ambrosiana

<b>AMBIT</b>	50422-Funzioni biologiche integrate di organi, sistemi e apparati umani
<b>INDIVIDUAL STUDY (Hrs)</b>	90
<b>COURSE ACTIVITY (Hrs)</b>	60

**EDUCATIONAL OBJECTIVES OF THE MODULE**

Understand the physical and chemical mechanisms and the molecular basis of fundamental cellular physiological processes such as: the membrane electrical polarization, the genesis of the action potential (excitability), the communication between cells via synapses, muscle contraction, transduction of stimuli physiological into electrical signals by receptor cells of the sensory systems and the study of reflex activity  
The course aims to put students in a position to:

- know the functions of blood and body fluids;
- describe the physical basis of the cardiovascular and respiratory systems, explaining the physiological processes in terms of the appropriate physical and chemical laws and understand the method of application of such laws;
- understand the regulatory mechanisms of nervous and humoral such equipment and their coordination in the execution of specific tasks such as: the homeostasis of the medium inside, osmolarity and extracellular fluid volume, the regulation of blood pressure and cardiac output ;
- understand and know the functioning excretory with particular regard to the formation of urine; Explain muscle adjustments, cardio-circulatory and respiratory during exercise.

**SYLLABUS**

Hrs	Frontal teaching
60	60 Lessons 2 Describe the body fluids and their composition with references to the budget hydrocarbon electrolyte. Sketch of the water transport mechanisms and of the solutes through biological membranes. 4 Describe the genesis excitability 'phone. Illustrate the mode 'of interaction between excitable cells. Explaining the modalities' of the receptor cells function and the transduction mechanisms of various forms of energy. Generality 'on the activity' reflected 4 Indicate the biophysical and mechanical bases of muscle contraction. Describe the functional characteristics of the striatum and the smooth muscle. Provide electromyography rational. 3 Describe the morphological and functional characteristics of blood components: red blood cells, white blood cells, platelets, plasma proteins. Explain the process of hemostasis and fibrinolysis 3 Explain excitability 'phenomena and automatism heart. Influence on the activity of SNV 'heart. 3 Explain in terms electrophysiological mode 'of production and significance of normal waves in the ECG and the concept of cardiac electrical axis. 4 Explain the phases of the cardiac cycle correlating with cardiac mechanics defining the stroke volume and cardiac output. Heart sounds. 1 Explain the functions (in relation to the structure) of the different sections of the tree vessel: arterial system, capillary, venous system, the capillaries circles and their peculiarities' organ. 2 The arterial pulse and jugular venous pulse. Blood pressure measurement. 3 Explain the mechanisms of regulation of the activities' heart rate and blood pressure 2 Describe briefly the morphological and functional aspects of microcirculation and dell'emoreologia and explain its meaning. 2 The venous circulation. Provide basic information on the relationships between structure and function of the lymphatic system 2 Function respiratoria.'attivita 'breathing with the morphology and functionality' of the structures that will oversee. 2 Explain the physical basis of the alveolus lung expansion mechanism. Describe the basic concepts of physics of gases useful for the understanding of the two correlate of respiratory mechanics concepts and work of breathing. compliance concept. 2 Describe the spirometric investigation and correlate the results with the functionality 'breathing. flow-volume curves 2 illustrate the principles and the physiological mechanisms that regulate the alveolar-capillary gas exchange. the ventilation ratio - perfusione and Transport of respiratory gases in the blood. 2 Explain the chemical mechanisms, nervous and other nature that regulate the activity 'respiratory 2 Explaining the modalities' of the plasma pH adjustment on the part of the respiratory function and recognize the changes in pH due to this. 5 Describe and explain in terms anatomical and functional (correlating functions with the responsible anatomical structures), the Formation of urine: glomerular filtration, tubular secretion and re-absorption and excretion. 1 Please indicate the fate of the most 'important plasma components as they pass through the kidney 2 illustrate the contribution of the kidney water-salt balance, blood pH, blood volume and blood pressure. 1 Describe the physiological mechanisms of urination 4 Explain muscle adjustments, cardio-circulatory and respiratory during physical activity.

**MODULE  
MODULE I**

*Prof. GIUSEPPE FERRARO - Sede IPPOCRATE, - Sede IPPOCRATE*

**SUGGESTED BIBLIOGRAPHY**

Fisiologia umana. A cura di F. Grassi, D. Negrini e A. Porro. Poletto Editore  
Fisiologia Medica. A cura di F. Conti – Edi-Ermes

<b>AMBIT</b>	50422-Funzioni biologiche integrate di organi, sistemi e apparati umani
<b>INDIVIDUAL STUDY (Hrs)</b>	90
<b>COURSE ACTIVITY (Hrs)</b>	60

**EDUCATIONAL OBJECTIVES OF THE MODULE**

The student must know and learn the basic mechanisms of cellular excitability, transduction and transmission. Furthermore, the student must understand the functioning of the cardiovascular system and integrated control processes that allow compensatory responses to functional and environmental stress. Furthermore, the student must know and learn the respiratory functioning aspects of its integrated control and interaction mechanisms with the cardiovascular system .

**SYLLABUS**

Hrs	Frontal teaching
2	Genesis of cellular excitability. The Mechanisms of water transport and solutes through biological membranes .
3	Interaction between excitable cells. Fundamentals on reflex activity
2	Physiology of the receptor cells and the transduction mechanisms of various forms of energy.
2	Heart properties, phases of the cardiac cycle , cardiac electro-mechanical coupling , cardiac, aortic and pulmonary pressures, systolic and cardiac output, changes according to preload and afterload .
3	Excitability phenomena and automatism in the heart . Genesis and meaning of normal ECG.
6	Functional characteristics of the skeletal and smooth muscles
3	Mechanisms of intrinsic and extrinsic regulation of heart activity ( role of the autonomic nervous and endocrine components). Relationship between blood pressure and heart activity, systolic and cardiac output, vascular resistance and plasma volume .
2	blood pressure , sphygmomanometry .
1	Body fluids and their composition. Fluid and electrolyte equilibrium .
6	Plasma and blood cells
2	Hemostasis and fibrinolysis .
2	Microcirculation and hemorheology . Structure and function of the lymphatic system .
3	The vascular tree sections: arterial capillary and venous systems . Capillary districts and their organ peculiarities.
2	Phases of respiratory activity and its control structures.
2	Thoraco-pulmonary mechanical function
2	Physics of respiratory gases
3	Work of breathing.
1	Spirometry and respiratory function
3	Alveolar- capillary gas exchanges and transport of respiratory gases in the blood .
3	Nervous and chemical regulation of respiration
2	Respiratory control of plasma pH
2	Cardio-circulatory and respiratory adaptations during exercise

## MODULE MODULE I

*Prof. GIUSEPPE MORICI - Sede HYPATIA, - Sede HYPATIA*

### SUGGESTED BIBLIOGRAPHY

Fisiologia Umana a cura di F. Grassi e altri. Poletto Editore 2015  
 Fisiologia. Di R.M. Berne, M.N. Levy, B.M. Koeppen, B.A. Stanton. Casa Editrice Ambrosiana  
 Fisiologia Medica. A cura di F. Conti – Edi-Ermes  
 Fisiologia Umana. Di Schmidt, Lang, Thews. Idelson-Gnocchi

<b>AMBIT</b>	50422-Funzioni biologiche integrate di organi, sistemi e apparati umani
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<b>INDIVIDUAL STUDY (Hrs)</b>	90
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<b>COURSE ACTIVITY (Hrs)</b>	60
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### EDUCATIONAL OBJECTIVES OF THE MODULE

Understand the physical and chemical mechanisms and the molecular basis of fundamental cellular physiological processes such as: the membrane electrical polarization, the genesis of the action potential (excitability), the communication between cells via synapses, muscle contraction, transduction of stimuli physiological into electrical signals by receptor cells of the sensory systems and the study of reflex activity. Know the functions of blood and body fluids. Describe the physical basis of the cardiovascular and respiratory systems. Explain the physiological processes in terms of the appropriate physical and chemical laws and understand the method of application of such laws. Understand the nervous and humoral regulatory mechanisms and their coordination in the execution of specific tasks such as: the homeostasis of osmolarity and extracellular fluid volume, the regulation of blood pressure and cardiac output. Explain muscle, cardio-circulatory and respiratory adjustments during exercise.

## SYLLABUS

Hrs	Frontal teaching
2	Describe the body fluids and their composition
2	Describe the general characteristics of omeostatic control systems
4	Sketch of the water transport mechanisms and of the solutes through biological membranes.
2	Describe the genesis excitability 'phone
4	Illustrate the mode 'of interaction between excitable cells. Explaining the modalities' of the receptor cells function and the transduction mechanisms of various forms of energy.
2	Generality 'on the activity' reflected
4	Describe the functional characteristics of the striatum muscle and the smooth muscle.
2	Explain heart excitability 'phenomena and automatism
4	Explain the phases of the cardiac cycle correlating them with cardiac mechanics defining the stroke volume and cardiac output
3	Explain the mechanisms that regulate cardiac activity and blood pressure
1	Blood pressure measurement
3	Explain in terms electrophysiological mode 'of production and significance of normal waves in the ECG and the concept of cardiac electrical axis.
3	Describe the morphological and functional characteristics of blood components: red blood cells, white blood cells, platelets, plasma proteins.
1	Explain the process of hemostasis and fibrinolysis
2	Explain the functions (in relation to the structure) of the different sections of the tree vessel: arterial system, capillary, venous system, the capillaries circles and their organ peculiarities
1	Describe briefly the morphological and functional aspects of microcirculation
1	Provide basic information on the relationships between structure and function of the lymphatic system
2	Describe the basic concepts of physics of gases useful for the understanding of respiratory function
2	Correlate respiratory activity with morphology and functionality' of the structures that will oversee.
1	Explain the physical basis of the alveolus lung expansion mechanism.
2	Correlate respiratory mechanics concepts and work of breathing
3	Describe the spirometric investigation and correlate the results with the breathing functionality. Flow-volume curves
3	illustrate the principles and the physiological mechanisms that regulate alveolar-capillary gas exchange and transport of respiratory gases in the blood
2	Explain the chemical ,nervous and other nature mechanisms that regulate the respiratory activity



4	Explaining the modalities of plasma pH adjustment on the part of the respiratory function and recognize the changes in pH due to this.
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**MODULE  
MODULE II**

*Prof. NATALE BELLUARDO - Sede IPPOCRATE, - Sede IPPOCRATE*

**SUGGESTED BIBLIOGRAPHY**

Fisiologia Medica. F. Conti – Edi-Ermes  
Fisiologia umana. F. Grassi, D. Negrini e A. Porro. Poletto Ed.

<b>AMBIT</b>	50422-Funzioni biologiche integrate di organi, sistemi e apparati umani
<b>INDIVIDUAL STUDY (Hrs)</b>	90
<b>COURSE ACTIVITY (Hrs)</b>	60

**EDUCATIONAL OBJECTIVES OF THE MODULE**

Knowing the characteristics of communication between neurons , the high specialization of synapses and their role in processes of synaptic plasticity and neuronal basis of learning and memory. Knowing the bottom-up flows of information coming from the sensory organs and top down from the cerebral cortex. Knowing the functional organization of the various regions of the central nervous system that organize the motor activities and analyze the various sensory perceptions, with particular attention to brain higher cognitive functions of the cerebral cortex , such as language, the emotional and behavioral responses , the mechanisms of attention , mood and motivation. Wake and sleep rhythm.

**SYLLABUS**

Hrs	Frontal teaching
2	Functional organization of the central nervous system , with particular attention to the cerebral cortex . Organization of the peripheral and autonomic nervous system.
3	Neuronal electrical events : genesis and propagation of action potential;
5	Synaptic transmission and its modulation of synaptic integration mechanisms, release of neurotransmitters and neuropeptides and their interaction with the different classes of receptors. The synapse as the site of transmission of the action potential and intracellular signals that regulate the cell activity and gene expression . Synaptic plasticity and neurotrophic factors involved. Functions of glia.
4	Functional organization of vision and hearing with description of stimulus transduction into electrical event with encoding capacity of sensory information. Reflexes pupillary and accommodation .
5	Physiology of somatic (tactile , thermal , pain , proprioceptive ) and visceral sensitivity. Physiology of taste and smell.
4	Organization of the motor system on voluntary movement.
3	Functional characteristics of cerebellar circuits involved in the control of the motor activity; .
2	Functional characteristics of basal ganglia circuits involved in the control of the motor activity. Cognitive and emotional role of the basal ganglia.
1	Mechanisms of spinal motor coordination : reflex action , the role of interneurons ;
4	Muscle tone and its regulation. Posture: brainstem mechanisms ; postural reflexes ; vestibular apparatus, tonic labyrinthine and neck reflexes. Locomotion. Ocular motility.
9	Functional organization of the cerebral cortex : role of the primary areas , associative uni- and multimodal of the occipital , temporal , parietal and frontal lobes. Functional symmetries and asymmetries of the two cerebral hemispheres . Top down and bottom up mechanisms to the base of the attention and consciousness.
2	Electroencephalography and its application. Anatomico-functional bases of sleep.
5	Anatomical and functional aspects of the limbic system : types of emotions, involved circuits and visceral- motor and behavioral reactions.
2	Anatomical and functional aspects of spread neurochemical systems: cholinergic, noradrenergic, dopaminergic, serotonergic and histaminergic and their impact in the cortical, emotional and behavioral activities '
2	Physiology of language
2	Formation of implicit, explicit and working memory and the brain areas involved
3	Homeostatic functions of the hypothalamus. Sexuality ' as a complex system of neuro-psycho-endocrinologic type.
2	Stem cells in the adult brain and functional aspects.

**MODULE  
MODULE III**

*Prof. PIERANGELO SARDO - Sede IPPOCRATE, - Sede IPPOCRATE*

**SUGGESTED BIBLIOGRAPHY**

Fisiologia umana. A cura di F. Grassi, Daniela Negrini e A. Porro. Poletto Editore  
Fisiologia Medica. A cura di F. Conti – Edi-Ermes

<b>AMBIT</b>	50422-Funzioni biologiche integrate di organi, sistemi e apparati umani
<b>INDIVIDUAL STUDY (Hrs)</b>	75
<b>COURSE ACTIVITY (Hrs)</b>	50

**EDUCATIONAL OBJECTIVES OF THE MODULE**

The course aims at building structured knowledge about renal actions on electrolyte balance and toxin removal, on gastrointestinal digestion and absorption processes, as well as on hormones and their integrated actions.

**SYLLABUS**

<b>Hrs</b>	<b>Frontal teaching</b>
9	Anatomic and functional bases of urine formation: glomerular filtration, tubular reabsorption and secretion, elimination
2	Glomerular ultrafiltration of plasma components.
2	Renal actions on water-electrolytic balance, acid-base balance, blood volume and pressure control.
1	Physiology of micturition.
8	Functions of the alimentary canal: motility, secretion, digestion, absorption.
3	Control of gastrointestinal functions exerted by Central and Enteric nervous systems and by gastrointestinal hormones.
2	Motility of colon-rectum. Evacuation reflex.
3	Nervous and endocrine control of fluid and dietary intake.
3	Role and functions of the liver in nutrition and metabolism. Mechanisms of thermoregulation.
2	Mechanisms of hormonal actions as specific messengers. Endocrine actions of thymus gland and pineal body.
2	Hormones released by hypothalamus and anterior hypophysis. Feedback control of hormonal secretion.
2	Hormonal control of blood glucose.
1	Control of blood calcium; role of parathyroids
2	Hormonal control of somatic growth.
2	Specific hormonal effects on target organs and apparatuses. pre- and post-hypophyseal hormones.
2	Thyroid and Parathyroid hormones.
2	Hormones released by cortex and medulla of the Adrenal gland.
2	Sex hormones.

**MODULE  
MODULE III**

*Prof.ssa GIUSEPPA MUDO' - Sede CHIRONE, - Sede CHIRONE*

**SUGGESTED BIBLIOGRAPHY**

FISIOLOGIA MEDICA. A cura di F. Conti – Edi-Ermes  
 FISIOLOGIA UMANA. Di Schmidt, Lang, Thews . Idelson-Gnocchi  
 FISIOLOGIA DI BERNE E LEVY. Sesta edizione. B. A. Koeppen, B. A. Stanton, R. M. Berne, M. N. Levy - CEA edizioni

<b>AMBIT</b>	50422-Funzioni biologiche integrate di organi, sistemi e apparati umani
<b>INDIVIDUAL STUDY (Hrs)</b>	75
<b>COURSE ACTIVITY (Hrs)</b>	50

**EDUCATIONAL OBJECTIVES OF THE MODULE**

Put the student to be able to understand the processes that identify the functional role of gastro-intestinal and endocrine apparatus.

Knowing the digestion-absorption processes that identify the functional role of the digestive system.

Learn about the hormones and their integrated actions

**SYLLABUS**

Hrs	Frontal teaching
1	Presentation of the course organization. Illustration of the anatomical and functional digestive relations.
5	Bioenergetics, physical activity and resting metabolic rate. The qualitative nutritional needs and body quantities in various physiological conditions.
6	The caloric food ingredients: carbohydrates, proteins, lipids. The non-caloric food ingredients: vitamins, minerals, water.
8	Motor, secretory, digestion and absorption functions of the digestive system. Regulatory mechanisms: the CNS, the enteric brain and gastrointestinal hormones.
2	Liver role in nutrition and intermediary metabolism.
2	Mechanisms of neuro-hormonal control of fluid and food intake
2	The homeostatic functions of the hypothalamus
2	Mechanisms of thermoregulation
2	Mechanisms of action of hormones in the transmission of specific messages
5	The functions of the hypothalamic hormones and adeno-pituitary hormones. The feedback mechanisms controlled by the hypothalamus-pituitary gland. general and specific feedback mechanisms in the regulation of hormonal increscion. Brief overview on thymus and epiphysis endocrine function
3	Hormonal control of blood glucose
3	Integrated mechanisms of serum calcium control, the role of parathyroid hormone, vitamin D3 and calcitonin
3	Mechanisms of hormonal control on general body growth. Role of the Growth hormon.
6	Specific effects of individual hormones on the functions of different organs and systems that represent the target: pre and post-pituitary hormones, thyroid hormones, hormones of the adrenal cortex and medulla, male and female gonadal hormones