

## ***TEACHING CARD***

**Study Programme:** Medicine and Surgery

**Course:** Physiology II

**Year of study:** II

**Semester:** II

**Number of credits (ECTS):** 10

**Course Coordinator:** Sergio Delle Monache

**Corse unit:** Physiology (9 ECTS)

Disciplinary scientific sector: **BIO / 09**

### **Professors:**

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### **Methods and didactic approaches of sports activities**

Disciplinary scientific sector: **M-EDF / 02 (1 ECTS)**

**Professor:** Gabriele Pallone (1 ECTS) [gabriele.pallone@unicamillus.org](mailto:gabriele.pallone@unicamillus.org)

## ***GENERAL INFORMATION***

### **Prerequisites**

The treatment of the specific topics of the course requires detailed knowledge of Anatomy, Medical Physics, Biology and Biochemistry.

### **Educational Goals**

The course aims to provide the knowledge of the fundamental physiological mechanisms of human functions. The course includes the acquisition of knowledge on the operating principles of the organs that compose the human body, and their dynamic integration into apparatus. The course will allow to

acquire the ability to independently apply the knowledge of organ and system functioning mechanisms to situations of potential functional alteration. Students will also need to know the main indicators and normal parameters of human physiological functions, and the related measurement methods. These objectives will be achieved through lectures, seminars and interactive teaching activities, aimed at facilitating learning and improving the ability to solve simple physiological problems.

## **Expected learning outcomes**

### **1. Knowledge and Understanding**

Conceptual and methodological tools will be offered for starting up the study of human physiology, through the acquisition of knowledge and understanding of the physiological principles that govern the function of the organism's systems. To demonstrate the knowledge of organ functions and to acquire the ability for integrating physiology from the cellular and molecular level to the organ and apparatus systems. To know the adaptations of the vital functions of the human body in response to the practices of physical activity. Evaluate the consequences of alterations at organ level in the overall functioning of the human body.

### **2. Applying Knowledge and Understanding**

To autonomously apply the knowledge of the organ and system functioning mechanisms to situations of potential functional alteration relating to the specific field to which the student will dedicate himself in the professional activity.

### **3. Making Judgements**

At the end of the course the student will have acquired knowledge that will enable him/her to describe the mechanisms underlying the functions dealt with and to assess independently different opinions on problematic aspects of Human Physiology. To recognize the importance of a thorough knowledge of the topics covered for an adequate medical education. To identify the fundamental role of the correct theoretical knowledge of the subject in clinical practice.

### **4. Communication Skills**

To orally present the topics in an organized and coherent way, using an adequate scientific terminology and compliant with the topic of the discussion.

### **5. Learning Ability**

To identify the possible applications of the skills acquired for the future career and to have communication skills for conveying the learned knowledge.

## ***SYLLABUS***

### **Sensory Physiology**

Visual system: anatomy of the visual system, the eyes, the photoreceptors, the retina, the connections between the eye and the brain, the coding of visual information in the retina, the extrastriate visual cortex, the associative visual cortex. Auditory system: ear anatomy, auditory pathway, perception of sound characteristics. Vestibular system: anatomy of the vestibular apparatus, receptor cells, the vestibular pathway. Olfactory System: anatomy of the olfactory system, transduction of olfactory information, perception of odors. Taste system: the anatomy of gustatory buttons and taste cells, the perception of gustatory information, the gustatory pathway.

### **Blood and hemostasis**

Features, development and function of blood. Plasma and serum. Blood elements. Red blood cells: development, features and functions. White blood cells: development, features and functions. Platelets: development, features and functions. Hemoglobin and blood buffering systems. Blood groups. Receptors involved in the function of blood elements. Hemostasis and Coagulation

### **Physiology of the Renal and Urinary System**

Development and structure of the kidney and urinary tract. Vasculature and blood pressure through the kidney. The nephron, Bowman's capsule, proximal tract, loop of Henle, distal tract, collecting tubules, collecting ducts: structure and functions. Elements of renal function: urine formation, hematopoiesis, general, hormonal and bone metabolism, electrochemical balance, blood volume, arterial pressure (juxtaglomerular apparatus; intrinsic and extrinsic mechanisms on arterial pressure control). Glomerular filtration rate and plasma filtration rate. NET filtration pressure. Mechanism of filtration, secretion, reabsorption and elimination. Receptors involved in renal physiology. Renal clearance. Tubular transport: mechanisms and measurements. Acid-base mechanisms and buffering systems. Acidosis and alkalosis

### **Physiology of the Digestive System**

Digestive system. Secretory function of digestive system. Motility. and salivary glands. Role of the autonomic nervous system and gastrointestinal hormones. Nutrient digestion and absorption. Hepatobiliary function.

### **Endocrine system**

Hormones: mechanism of action. Pituitary hormones and hypothalamic control. The Thyroid gland. The adrenal gland. Endocrin regulation of growth. Control of Calcium and phosphate metabolism.

The endocrine pancreas and glucose metabolism. The female reproductive system: ovaric cycle and menstrual cycle.

**Control of temperature and Energy metabolism.**

**Adaptation to physical exercise.**

### **Methods and didactic approaches of sports activities**

The “workout”. Principles of Training. Overload Components. Motor skills. Supercompensation. Training planning. Sensoperception. Motor learning. Train the Resistance. Train the Strength. Train the Speed. Train coordinative skills. Didactic approaches to training.

### **Teaching method**

The course is structured in 90 hours of frontal teaching, divided into lessons of 2 or 4 hours based on the academic calendar. Lectures will include theoretical lessons and supplementary seminars on the topics covered. In addition, the student will be involved in critical reading, understanding and discussion of a scientific article related to the topics covered in the teaching module. The course will also provide indications on how a bibliographic search should be made and on how to read a scientific article about the human physiology.

### **Learning assessment procedures**

The verification of the student preparation will take place with a written exam followed by an oral exam. The written test will consist of 30 questions with multiple choice answers, for each correct answer a point will be assigned. The final score of the written test will be given by the sum of the partial scores assigned to each question answered correctly. To access the oral exam, the student must have totaled at least a minimum of 18 points. During the oral exam, the examining Commission will assess the student's learning skills as well as the ability to apply the knowledge and ensure that the skills are adequate to support and solve problems of a physiological nature (50% of the score). It will also be assessed: autonomy of judgment (25% of the score) and communication skills (25% of the score) as indicated in the Dublin descriptors.

### **Support activity**

In addition to the didactic activity, the student will be given the opportunity to attend seminars, research internships, laboratory attendance. The topics of the activities are not subject to examination.

## **Student reception**

The course teachers can be reached by appointment via e-mail.

## **Recommended texts**

- Human Physiology. Sherwood. Editore: Brooks/Cole
- Medical Physiology. Guyton and Hall. Editore: Saunders
- Neuroscience. Purves. Editore: OUP USA (to be integrated for the Nervous System)
- Essentials of Exercise Physiology. W.D. Mcardle, F.I. Katch, V.L. Katch, Casa Editrice Piccin