



Attachment 1: Course Syllabus Template

Degree Programme in MEDICINE AND SURGERY

Academic Year 2026 / 2027

INTEGRATED COURSE (I.C.): Physiology I

NUMBER OF CFU (ECTS credits): 10

SSD (Academic Discipline Code): BIOS-06/A, MEDF-01/A

COORDINATOR OF THE I.C.: [Prof.ssa Giovanna D'Arcangelo](#)

E-MAIL: giovanna.darcangelo@unicamillus.org

MODULE 1: Physiology

NUMBER OF CFU (ECTS credits): 9

SSD (Academic Discipline Code): BIOS-06/A

LECTURER: [Prof.ssa Giovanna D'Arcangelo](#) (2CFU)

Prof. [Claudio Frank](#) (3 CFU)

Prof. [Danny Spampinato](#) (2 CFU)

Prof.ssa [Annalisa Tassone](#) (2 CFU)

e-mail:

giovanna.darcangelo@unicamillus.org

claudio.frank@unicamillus.org

dannyadrian.spampinato@unicamillus.org

annalisa.tassone@unicamillus.org

MODULE 2: Methods and teaching of motor activity

NUMBER OF CFU (ECTS credits): 1

SSD (Academic Discipline Code): MEDF-01/A

LECTURER: [Prof.ssa Anna Maria Malagoni](#)

e-mail: annamaria.malagoni@unicamillus.org

PREREQUISITE COURSES

None required

PREREQUISITES

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

LEARNING OBJECTIVES

The course includes the acquisition by the student of knowledge of the operating principles of the organs that compose the human body, their dynamic integration into apparatus and the understanding of the general mechanisms of homeostatic function control and their variations following physical activity. The course also includes the ability to independently apply the knowledge of organ and system functioning mechanisms to potential functional alteration situations.

EXPECTED LEARNING OUTCOMES

By the end of the course, the student will be able to know and understand the physiological principles governing the function of the body's systems; to autonomously apply the knowledge of the organ and system functional mechanisms to situations of potential functional impairment; to recognize the importance of a thorough knowledge of the topics covered for an adequate medical education. Moreover the student will be able to demonstrate an adequate level of independent judgment and to possess the communication skills necessary to convey what has been learned.

DD 1: Knowledge and understanding

To know and understand the physiological principles governing the function of the body's systems. To demonstrate the knowledge of cellular and organ functions and to acquire the ability to integrate the physiology from the cellular and molecular level to the organ and apparatus systems. To describe the molecular and functional aspects of each organ in humans, necessary for the homeostasis maintenance. To know the adaptations of the vital functions of the human body in response to the practices of physical activity. To evaluate the consequences of alterations at the cellular and organ level in the overall functioning of the human body.

DD 2: Applying knowledge and understanding

To autonomously apply the knowledge of the organ and system functional mechanisms to

situations of potential functional impairment relating to the specific field to which the student will dedicate himself in the professional activity.

DD3: Making judgements

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.

DD4: 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.

DD5: Learning skills

To identify the possible applications of the skills acquired in the future career and to have communication skills to convey what has been learned.

SYLLABUS

Syllabus MODULE 1: Physiology

Cellular Physiology

Homeostatic mechanisms and control systems. Transport across the cell membrane. Passive and active membrane transport processes. Osmosis. Cell membrane potential and equilibrium potential. Electrical properties of the cell membrane. Propagation of electrical signals along excitable fibers. Voltage-gated Na^+ , K^+ , and Ca^{2+} ion channels. Action potential and membrane refractoriness. Electrical signal propagation and action potential conduction. Electrical and chemical synapses. Excitatory and inhibitory synaptic potentials. Neurotransmitters and their receptors. Signal transduction and intracellular signaling pathways. Synaptic integration. Neuromuscular junction. Examples of diseases associated with alterations in neural communication.

Muscle Physiology

Structure of the contractile apparatus of skeletal muscle. Sliding filament theory. Cross bridge cycle and force development. Excitation–contraction coupling. Single twitch and tetanic contraction. Isometric and isotonic contractions. Length–tension and force velocity relationships. Muscle power. Energy sources for muscle contraction. Muscle fatigue. Motor unit. Smooth muscle: regulation and control of smooth muscle contraction.

Cardiovascular physiology

General organization and functions. Heart and myocardium. Types of muscle fibers. Pacemaker and conduction system. Contractile fibers. Excitation-contraction coupling. Electrocardiogram. Cardiac cycle. Preload, afterload, and contractility. Cardiac output. Sympathetic and parasympathetic regulation of the cardiovascular system. Coronary circulation. Fetal circulation. Arterial and arteriolar systems. Capillary fluid and substance exchange. Venous system. Regulation of blood pressure. Cardiovascular function in pathological conditions.

Nervous System Physiology.

Organization of the nervous system. Sensory receptors. Somatic sensitivities: tactile and proprioceptive sensitivity. Pain. Motor functions of the spinal cord: spinal reflexes. Control of motor function by the cerebral cortex and the brainstem. Basal nuclei and motor control. Cerebellum and motor control. Cerebral cortex and intellectual functions: language, memory and learning. Sleep-wake rhythm. Functions of the limbic and hypothalamus system. Autonomous nervous system and adrenal medulla.

Respiratory System Physiology.

Organization of the respiratory system. Lung ventilation. Pulmonary circulation. Alveolar-capillary gas exchange. Oxygen and carbon dioxide transport in the blood and body fluids. Ventilation and perfusion of the lungs. Breathing regulation. Respiration at high altitude. Adaptations of the respiratory system to physical exercise.

Syllabus MODULE 2: Methods and Teaching of Motor Activities.

Energy systems involved in exercise (ATP turnover, phosphagen system, glycolytic and oxidative metabolism). The role of lactate in exercise physiology ((lactate production, clearance, shuttle mechanisms, lactate threshold, and exercise-related physiological significance). Oxygen uptake kinetics during exercise and recovery (VO_2 kinetics, oxygen deficit, EPOC). Maximal oxygen consumption (physiological determinants, measurement modalities, clinical interpretation).

Physical capacity and cardiorespiratory fitness evaluation (functional capacity assessment, clinical application, prognostic value). Principles of physical exercise prescription (exercise-defining parameters, intensity domains based on physiological indicators and their measurement, individualization). Exercise in the prevention and treatment of chronic diseases (exercise as a preventive and therapeutic intervention, with particular reference to cardiovascular and metabolic diseases).

COURSE STRUCTURE

The course is structured in 200 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. The attendance is mandatory for 67%.

COURSE GRADE DETERMINATION

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.

Fail	Significant gaps and/or inaccuracies in knowledge and understanding of the topics; limited analytical and synthesis skills; argumentation absent or frequently incorrect.
18–20	Barely sufficient knowledge and understanding of the topics, with possible imperfections; sufficient analytical, synthesis, and judgement skills.
21–23	Routine knowledge of the topics; correct analytical and synthesis skills with coherent logical argumentation.
24–26	Fair knowledge and understanding of the topics; good analytical and synthesis skills; rigorously expressed argumentation.

27–29	Complete knowledge of the topics; considerable analytical and synthesis skills; good independent judgement.
30–30L	Excellent level of knowledge and understanding. Considerable analytical, synthesis, and independent judgement skills. Original argumentation expressed with full command of specialized terminology.

OPTIONAL ACTIVITIES

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.

READING MATERIALS

Texts MODULE 1

Guyton & Hall, Textbook of Medical Physiology, Elsevier, 2024.

Neuroscience. Purves. Editore: OUP USA (to be integrated for the Nervous System)

- Cardiovascular Medical Physiology: from Biophysics to Pathophysiology and Clinical Practice. Andrea Vitali. Edizioni Scientifiche Falco. (for a more depth at the Cardiovascular System)

Texts MODULE 2

Essentials of exercise Physiology. W.D. Mcardle, F.I. Katch, V.L. Katch, Casa Editrice Piccin