



UNIVERSITÀ  
DEGLI STUDI DI MILANO-BICOCCA

## COURSE SYLLABUS

### Physiology

2627-1-I0305D002-I0305D00204

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#### Aims

The student will learn to know and describe the functional mechanism of the integrated biological processes in conditions of normality and the fundamental tools for the pathologic alteration comprehension

#### Contents

The course provides students with the fundamental theoretical knowledge of physiology, with a view to their subsequent professional application. The following concepts will be examined: the functional mechanisms of the biological phenomenon integrated in normal conditions and the basic tools to interpret pathological changes.

#### Detailed program

? Cellular physiology: homeostasis and internal environment; types of transmembrane transport; osmosis; membrane potential; Nernst equation; maintenance of salt-water balance.

? Physiology of the nervous system: types of neurons and synapses; the action potential; propagation of action potential, time and space constants; sensory receptors; signal transduction; somatic sensitivity; autonomic nervous system; motor control.

? Physiology of the muscle: muscle structure; nature of the contraction process; neuromuscular transmission; functional characteristics, myogram, force-length and force-velocity relationship; muscle energy, oxygen debt.

? Physiology of the cardiovascular system: viscosity and density of the blood; structure and

function of vessels; resistance and pressure; the heart; the cardiac cycle and the ventricular pressure-volume relationship; cardiac work; cardiac output and regional flow distribution;

the conduction system; the pacemaker and common myocardial potentials; the electrocardiogram; blood pressure and its determinants; blood pressure measurement.  
? Physiology of the respiratory system; oxygen transport system and utilisation; Dalton's law, Henry's law, Fick's law; transport of O<sub>2</sub> and CO<sub>2</sub> in the blood; haemoglobin curve, Fick's principle; principles of mechanics, lung volumes, spirometry, thoracic-pulmonary relaxation curves.

? Physiology of the digestive system.

? Renal physiology: nephron, renal blood flow, glomerular filtration rate; glomerular ultrafiltration and Starling's equation; functions of the proximal convoluted tubule, ion and glucose reabsorption; loop of Henle, urine concentration by countercurrent mechanism; distal convoluted tubule and collecting duct system; renin-angiotensin-aldosterone system; renal clearance, PAI, inulin and creatinine.

? Acid-base balance: Henderson-Hasselbalch equation; Davenport diagram.

? Principles of sports physiology.

## **Prerequisites**

Scientific knowledge at secondary school level.

## **Teaching form**

12 frontal lessons (2 hours each) in attendance and 6 frontal tutorials (2 hours each) in attendance.

## **Textbook and teaching resource**

AA.VV. : Fisiologia dell'uomo. Edizioni Edi.Ermes, Milano.

Guyton A.C.: Elementi di Fisiologia umana. Piccin Editore.

For the texts, reference is made to the latest available edition. Teacher will provide other educational material.

## **Semester**

First semester

## **Assessment method**

The written physiology test will consist of 30 multiple-choice questions to check preparation for the examination programme.

### **Office hours**

By appointment required by mail

### **Sustainable Development Goals**

GOOD HEALTH AND WELL-BEING | QUALITY EDUCATION | GENDER EQUALITY | REDUCED INEQUALITIES

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