UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Physiology

2425-1-I0302D003-I0302D012M

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 O2 and CO2 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 (egidio.beretta@unimib.it).

Sustainable Development Goals

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