



UNIVERSITÀ  
DEGLI STUDI DI MILANO-BICOCCA

## COURSE SYLLABUS

### Human Physiology - 1

2526-1-I0102D004-I0102D014M-T1

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#### Aims

To enhance knowledge of human physiology through teaching delivered by instructors specialized in the relevant field. Particular emphasis is placed on the integration of bodily systems and the function of the entire human body, making the instruction methodologically essential for understanding the monitoring of parameters and the procedures necessary for practicing as a midwife.

**Knowledge and Understanding** At the end of the course, the student will be able to:

Describe in detail the physiological mechanisms at both the cellular and systemic level, understanding how different organs cooperate to maintain the organism's homeostasis.

Analyze the functional interactions between systems (cardiovascular, respiratory, renal, endocrine) under physiological conditions and in response to internal or external stimuli.

Understand the molecular and biochemical foundations of physiological functions, with particular attention to regulatory signals, intercellular communication, and adaptive processes.

Interpret early signs of dysfunction and describe the continuum between normal physiology and the initial pathophysiological changes.

**Applying Knowledge and Understanding** At the end of the course, the student will be able to:

Apply integrated models to interpret system functions in complex, dynamic, and real-life conditions.

Recognize and analyze compensatory mechanisms and early functional changes that signal a transition toward pathophysiology.

Use a translational approach, integrating concepts of experimental physiology with clinical and preclinical scenarios.

**Autonomy of Judgment** The student will develop the ability to:

Formulate physiological and pathophysiological hypotheses based on evidence, interpreting both quantitative and qualitative data.

Critically evaluate the integration and coherence of information from various sources (biological, clinical, environmental).

Make independent assessments of adaptive mechanisms and functional deviations that precede disease.

**Communication Skills** The student will be able to:

Communicate physiological knowledge and its pathophysiological implications effectively using appropriate technical language.

Use digital tools, graphs, and experimental data to illustrate integrated functional models.

Actively participate in interdisciplinary discussions, clearly and concisely presenting complex concepts.

**Learning Skills** The student will be able to:

Plan autonomous learning strategies to update and deepen physiological knowledge.

Connect course content with related disciplines (pathology, pharmacology).

Identify personal learning needs and determine the most appropriate and up-to-date informational sources.

## Contents

The student will be guided through the physiological analysis of the main cellular functions and the interactions among the different body systems (e.g., cardiovascular, respiratory, endocrine, digestive), with an in-depth focus on specific key functional aspects selected for their clinical and pathophysiological relevance. Regulatory mechanisms and their integration across systems will be explored in detail, including responses to physiological stress and pregnancy.

The course will encourage a critical and integrated view of biological function, promoting the development of physiological thinking oriented toward translational medicine and clinical practice

## Detailed program

### Introduction to Physiology and General Principles

Definition of physiology and levels of biological organization

Homeostasis and control systems

Body compartments and membrane transport

Principles of biophysics: membrane potential, diffusion, osmosis

### Cellular Physiology and Communication

Resting membrane potential and action potential

Synapses and nerve transmission

Hormonal communication: receptors, intracellular signaling, feedback

### Nervous and Endocrine Systems

Organization of the central and peripheral nervous systems

Motor and sensory control

Hypothalamus and the endocrine system

Hypothalamic-pituitary axes, stress, and hormonal regulation

Neuroendocrine adaptations during pregnancy

### Cardiovascular Physiology

Structure and function of the heart

Cardiac cycle, cardiac output, heart rate

Systemic and pulmonary circulation

Blood pressure and its regulation

Cardiovascular changes during pregnancy

### Respiratory Physiology

Mechanics of breathing

Gas exchange and transport in the blood

Regulation of respiration

Respiratory adaptations in pregnancy

### **Renal Physiology and Fluid-Electrolyte Balance**

Glomerular filtration, reabsorption, and secretion  
Regulation of fluid-electrolyte and acid-base balance  
Role of the renal system in pregnancy

### **Digestive Physiology and Metabolism**

Digestion, absorption, and gastrointestinal motility  
Hormonal regulation of the digestive system  
Basal metabolism and thermoregulation

### **Prerequisites**

Basic knowledge of Biology, Chemistry, Biochemistry.

### **Teaching form**

Lectures; in particular, 30 hours of lecture-based teaching and 4 hours of interactive teaching

### **Textbook and teaching resource**

Poltronieri Elementi di Fisiologia EdiSES

PHYSIOLOGY - Sherwood L. (2012) Fondamenti di Fisiologia Umana, Piccin-Nuova Libreria. Open choice by students among the Medicine Library's Physiology text books.

### **Semester**

1 year - 2 Semester

### **Assessment method**

Written exam. A quiz with 33 questions will be proposed with 5 possible answers of which only one is the correct one

### **Office hours**

Previous appointment  
ilaria.rivolta@unimib.it

## Sustainable Development Goals

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

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