

## SYLLABUS DEL CORSO

### Physiology

2425-4-H4102D024-H4102D080M

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#### Aims

- To provide basic understanding of the function of cardiovascular system and its homeostatic control
- To relate physiologic principles to cardiovascular disease states, diagnosis and treatment
- To illustrate clinical applications of important physiology concepts

#### Contents

- Cardiac physiology and adaptations (in health and disease)
- Physiology of the systemic and pulmonary circulations
- Regulation of cardiovascular function
- Methods of measurement of cardiovascular function

#### Detailed program

The heart

Structural and functional aspects of cardiac excitation - the electrical cycle (with reference to ECG)

Structural and functional aspects of cardiac excitation-contraction coupling and its modulation (inotropy, lusitropy)

The cardiac mechanical cycle (on pressure/time and pressure/volume planes) – definition of “systolic” and “diastolic” functions and their coupling.

Cardiac “mechanical” and “chemical” work - relation to cardiac O<sub>2</sub> consumption (myocardial efficiency)

Cardiac adaptation to preload and afterload changes in health and disease

Principles of cardiac (systolic and diastolic) functional measurements (invasive and imaging).

The systemic circulation:

Large arteries dynamics: windkessel mechanism, pressure pulse and its propagation

Small arteries: regulation of peripheral resistance (intrinsic, neural, paracrine)

Systemic pressure/flow relationship

Determinants of capillary filtration/reabsorption balance – mechanisms of “edema”

Mechanisms of venous return (preload maintenance and regulation)

The coronary circulation

Subepicardial and intramural vessels

Left vs right flow profiles – phasic LV flow

Wall stress and extravascular compression- concept of “closure pressure”

Coronary flow reserve and its recruitment

Paracrine and neural regulation (redundancy and feed-forward)

Coronary flow during exercise (consequences of proximal obstruction)

The pulmonary circulation

Structure-function peculiarities

Pulmonary vascular resistance : definition, regulation and measurement

Regulation of cardiovascular function

Pressure / volume homeostasis (neural and endocrine)

Adaptation to physiologic demand (exercise, gravity, pregnancy etc)

## Prerequisites

- Fundamentals of human physiology module (by Profs. Sancini and Rivolta)
- English language

## Teaching form

- Frontal teaching (about 60%) and interaction with the audience (tracing and case discussion, about 40%)  
All course activities will be held in English

## Textbook and teaching resource

- Basic Cardiovascular Physiology (Pagliaro et al) River Publishers 2020 - available as on-line resource at: <https://login.proxy.unimib.it/login?url=https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=2634437&lang=it&site=eds-live&scope=site>
- Guyton and Hall Textbook of Medical Physiology 12 edition. Saunders Elsevier 2011, Unit III (The Heart) and IV (The Circulation)
- Mohrman DE, Heller LJ. Cardiovascular Physiology 9th edition. McGraw Hill 2018

## **Semester**

1st semester

## **Assessment method**

Questions concerning this module will be included in the written questionnaires of the CV track. Questions during the CV track oral exam

## **Office hours**

Office hours on appointment (email to [antonio.zaza@unimib.it](mailto:antonio.zaza@unimib.it))

## **Sustainable Development Goals**

GOOD HEALTH AND WELL-BEING

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