



UNIVERSITÀ  
DEGLI STUDI DI MILANO-BICOCCA

## COURSE SYLLABUS

### Physiology

2021-4-H4102D029-H4102D107M

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#### Aims

The course aims to allow medical students to understand renal physiology using methods which improve their deep learning of the physiological process at the basis of the kidney functions. This will provide them the tools to consciously approach the diseases of the kidney and of the urinary tract. At the end of the course the student will be able to discuss the glomerular functions and its regulation, the hydro-electrolyte homeostasis and the role of the kidney in the regulation of the blood pressure and in the acid/base homeostasis.

#### Contents

The course will examine aspects of the renal physiology as they serve to introduce the students to the relevance and the importance of the kidney system. The module will address important homeostatic kidney functions such as the capacity to regulate the concentration of solutes and electrolytes within the blood and matching their excretion in the urine, to regulate the blood pressure and the maintenance of the pH of the extracellular fluid through the excretion and synthesis of acidic and basic molecules. Moreover, a number of important endocrine functions carried out by the kidney will be presented.

#### Detailed program

Functional organization of the glomerulonephronic unit

Glomerular filtration, glomerular filtration rate

Renal blood flow

Tubular reabsorption and transport. The topic will be detailed in the proximal tubule, descending loop of Henle, thin

ascending loop of Henle, thick ascending loop of Henle, early distal tubule, late distal tubule and collecting duct, peritubular capillary transport.

Mechanism of urine concentration and dilution

General Regulatory Mechanisms: regulation of GFR and RBF and glomerulo-tubular balance

Specific Regulatory Mechanisms: regulation of urine osmolarity, regulation of sodium excretion, potassium balance, regulation of phosphate excretion, regulation of calcium excretion

## **Prerequisites**

Fundamentals of Human Physiology, in particular the revision the balance in body fluid volume and composition addressed in the second year.

## **Teaching form**

Lectures with interactive presentation and discussion. Whenever possible, clinical case analyzes will be proposed for the evaluation of the specific physiological parameters. In case of pandemic resurgence the lessons will be through webinar.

## **Textbook and teaching resource**

Guyton & J.E. Hall, *Textbook of Medical Physiology*, Elsevier;

Boron WF, Boulpaep EL, *Medical Physiology*, Ed. Elsevier.

## **Semester**

Second Semester

## **Assessment method**

The exam consists in a written test. Four Open questions will be posed to the student in order to evaluate the general knowledge of the topics. Moreover, the student will be asked to answer to questions that require the analysis of a complex phenomenon, its rationalization and the application of specific physiology principles and to solve simple exercises. Finally, a clinical case may be presented which will require the analysis of the interconnections between different physiological variables in the light of the theoretical paradigms.

In case of pandemic recrudescence the exam will be oral.

## **Office hours**

By appointment. To be scheduled with Prof. Rivolta via e-mail.

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