UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Biochemistry II

2627-1-H4104D001-H4104D00103

Aims

The Biochemistry II module aims to offer the training bases for a detailed molecular knowledge of medicine and modern technological applications to medicine.
The course is aimed at understanding the basic mechanisms responsible for alterations of homeostasis and the onset of diseases. In this way we want to lay the foundations for the molecular understanding of the complex phenomena of communication, interaction and control of cellular and tissue functions. The course also aims to make understanding, at a biochemical and molecular level, the complex communication phenomena between organs and the control systems of their functions and their interrelations in physiological conditions.
It will also be illustrated the possible different uses of different techniques, even with the use of practical common examples, with the aim of providing students the opportunity to learn to choose the best solutions to practical problems in clinical practice in the biochemical field.

Contents

The Biochemistry II module will describe in detail the integrated biochemistry of organs and tissues. It will provide useful knowledge for the best understanding of other medical disciplines and clinics.The main mechanisms of biochemical regulation of the metabolism of blood, of the digestive system, cardiovascular, hepatic, of the nervous system will be illustrated. The hormonal and metabolic regulation of the metabolism and the conditions that can lead to their alteration will be described.

Detailed program

1. Hormonal Regulation of Metabolism
   Principles of endocrine regulation.

Insulin, glucagon, and somatostatin.
Integration of carbohydrate, lipid, and protein metabolism.
Hormonal adaptation to feeding, fasting, exercise, and stress.

2. Integration of Metabolism in Health and Disease
   Organ-to-organ metabolic communication.
   Fed-fast cycle.
   Metabolic flexibility.
   Adaptation to exercise, aging, inflammation, and stress.
3. Liver Metabolism and Systemic Metabolic Homeostasis
   Central role of the liver.
   Carbohydrate, lipid, and protein metabolism.
   Metabolic adaptation during feeding and fasting.
4. Renal Metabolism and Fluid-Electrolyte Homeostasis
   Renal metabolic functions.
   Acid-base balance.
   Water and electrolyte homeostasis.
5. Biochemical Control of Blood Pressure and Cardiovascular Homeostasis
   RAAS.
   Vasopressin.
   Nitric oxide.
   Cardio-renal-metabolic regulation.
6. Biochemistry of Blood and Hemostasis
   Erythrocyte metabolism.
   Hemoglobin and oxygen transport.
   Coagulation and hemostasis.
   7-8. Hypothalamic-Pituitary and Peripheral Endocrine Axes
   Pituitary hormones.
   Thyroid hormones.
   Adrenal hormones.
   Sex hormones.
   HPA axis.
7. Ethanol Metabolism and Xenobiotic Biotransformation
   Ethanol metabolism.
   Drug metabolism.
   Cytochrome P450.
   Detoxification pathways.
8. Oxidative Stress and Redox Biology
   ROS and RNS.
   Antioxidant systems.
   Redox signaling.
   Oxidative stress in metabolic, cardiovascular, renal, endocrine, and inflammatory diseases.
9. Nutritional Biochemistry and Metabolic Health
   Energy balance.
   Nutrients and micronutrients.
   Obesity, malnutrition, and metabolic syndrome.
10. Exam-like test

Prerequisites

Basic knowledge of biology and chemistry.

Teaching form

22 h (11 lessons, 2 h each): Frontal Lesson (DE), face-to-face lessons
2 h (1 activity): Interactive Lesson (DI), Exercises, face-to-face lessons

Textbook and teaching resource

Biochemistry with clinical cases . T. Devlin

Biochemistry, Berg et al.

Slides, scientific papers/reviews used during the frontal lessons will be loaded on e-learning platform.

Semester

Second semester.

Assessment method

Individual written examination
13 multiple-choice questions (2 marks each) on frontal lesson
1 open question (4 marks) on all the programme of the course
1 clinical case question (1 mark)
to be completed in 30 minutes.

The exam is positively evaluate with a score of 18/30 or higher. The questions proposed in the written exam will be constructed in such a way as to induce the student to biochemical reasoning, to understand the units of measurement and to be able to evaluate the skills and competences acquired according to the objectives of the course.

There are no itinere tests planned.

Office hours

On appointment to francesca.re1@unimib.it.

Sustainable Development Goals

GOOD HEALTH AND WELL-BEING