UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Pharmacology

2627-1-I0106D005-I0106D00501

Aims

The course is designed to provide students with the fundamental knowledge of Pharmacology, with particular emphasis on the principles of pharmacokinetics and pharmacodynamics, the mechanisms of drug action, therapeutic indications, adverse effects, and the criteria for the appropriate use of medicines according to the principles of evidence-based medicine. By the end of the course, students will have achieved the following learning outcomes:

Knowledge and understanding:
The course will provide a solid foundation for understanding the fundamental principles of pharmacokinetics and pharmacodynamics, the main molecular targets of drugs, their mechanisms of action, the processes of drug absorption, distribution, metabolism, and elimination, as well as the major pharmacological interactions and the scientific rationale underlying the clinical use of medicines.

Ability to apply knowledge and understanding:
The course will develop students' ability to apply the acquired knowledge to understand the therapeutic and adverse effects of drugs, interpret their appropriate use in different clinical and healthcare settings, recognize the main drug interactions, and contribute to the safe management of pharmacological therapy within their professional scope of practice.

Making judgements:
The course will develop students' ability to critically evaluate the use of medicines based on scientific evidence, recognizing their benefits, risks, and potential drug interactions, in order to contribute to patient safety and the appropriateness of pharmacological treatment. The assessment method, consisting of multiple-choice questions and open-ended questions, promotes the development of critical thinking and independent judgement in the application of pharmacological principles to clinical and healthcare contexts.

Communication skills:
The course will provide students with the skills required to communicate information about pharmacological therapy clearly and appropriately, collaborate effectively with other healthcare professionals, and provide patients with

accurate information on the safe and appropriate use of medicines while respecting their professional scope of practice.

Learning skills:
The course will enable students to develop an autonomous and critical approach to learning, supporting lifelong learning in pharmacology and evidence-based medicine, while facilitating the integration of this knowledge with subsequent clinical courses and future professional practice.

Contents

The course will examine: the principles underlying pharmacodynamics and pharmacokinetics, and drug biotransformation, distribution, and elimination; the determinants of the variability of drug responses; the preclinical and clinical phases of drug development. Develop skills to promote a multidimensional clinical approach according to a global vision of the concept of health, promote awareness of gender differences in healthcare.

Detailed program

GENERAL PRINCIPLES - Concepts of drug, toxicant, and placebo. - Methodologies for assessing toxicological risk and extrapolation of toxicity data from animals to humans - Pharmacological history - Methods for reporting adverse drug reactions to the competent authorities (pharmacovigilance) - Ethical and socioeconomic aspects of pharmacology.
PHARMACOKINETICS - Mechanisms regulating drug absorption across cell membranes – Routes of drug administration, their significance in therapy, and the concept of bioavailability - Mechanisms of drug distribution in the body, passage across cellular barriers, drug-protein binding, biotransformation and excretion processes, and their clinical relevance - Significance of plasma half-life and clearance of a drug in determining dosage - Methods for achieving and maintaining steady-state plasma concentrations of a drug - Drug kinetics for single or repeated administration - Dosage adjustments in relation to physiological and pathological changes in excretion and metabolism - Adverse drug reactions - Drug interactions. Basis for different drug responses at different ages and during pregnancy. Gender pharmacology, nutraceuticals, and alternative medicine.
CELLULAR AND MOLECULAR PHARMACOLOGY - Mechanisms of drug action, molecular targets, and the cascade of events through which a drug produces a cellular response - Cellular basis of drug responses - Agonists and antagonists and principles of structure/activity relationships - Quantitative dose-response relationship - Meaning of drug selectivity, specificity, toxicity, potency, and efficacy - Efficacy and potency of drugs based on their dose-response curves - Therapeutic index and assessment of the risk/benefit ratio of a drug therapy - Factors that influence drug response in relation to both concomitant diseases and therapies and at-risk populations - Pharmacogenetics, pharmacogenomics, and abnormal drug response.

GENERAL PHARMACOLOGY, NUTRACEUTICALS, and ALTERNATIVE MEDICINES

Introduction to Clinical Pharmacology

1. Drugs Acting on the Peripheral Nervous System

- Mediators and Receptors of the Sympathetic and Parasympathetic Nervous System
- Adrenergic Agonists and Antagonists
- Cholinergic Agonists and Antagonists

2. Nonsteroidal Anti-Inflammatory Drugs (NSAIDs)
3. Antibacterial and Chemotherapeutic Drugs:

- Antibacterials: beta-lactams, protein synthesis inhibitors, folic acid, DNA
- Antifungals, antivirals, antimalarials, antituberculosis

Prerequisites

None.

Teaching form

The lessons will be held in presence. Some lessons will be held through the Distance Learning mode Teledidattica

Textbook and teaching resource

Learning material (slides of the lessons) is available at the e-learning platform of the course.
Recommended textbook:

- Amico-Roxas M., Caputi A.P., Del Tacca M. (2021) Compendio di farmacologia generale e speciale. Torino, UTET Scienze mediche

Semester

I year, II semester

Assessment method

Written examination composed of 14 multiple choice questions and 2 open questions.
In the exam of Biomedical Sciences 2 it is necessary to reach the sufficiency in all 4 disciplines that compose it: Pharmacology, General Pathology, Microbiology, Clinical Biochemistry and Molecular Biology

Office hours

By appointment agreed by email

Sustainable Development Goals

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