VNIVERSITAT DE VALÈNCIA

Course Guide
34087 Pharmacology I

COURSE DATA

Data Subject	
Code	34087
Name	Pharmacology I
Cycle	Grade
ECTS Credits	6.0
Academic year	2022 - 2023

Study (s)

Degree	Center	Acad. year	Period
1201 - Degree in Pharmacy	Faculty of Pharmacy and Food Sciences	3	Second term
1211 - D.D. in Pharmacy-Human Nutrition and Dietetics	Faculty of Pharmacy and Food Sciences	3	Second term

Subject-matter

Degree	Subject-matter	Character
1201 - Degree in Pharmacy	21 - Pharmacology	Obligatory
1211 - D.D. in Pharmacy-Human Nutrition and Dietetics	1 - Asignaturas obligatorias del PDG Farmacia-Nutrición Humana y Dietética	Obligatory

Coordination

Name	Department
MONTESINOS MEZQUITA, MARIA CARMEN	135 - Pharmacology

SUMMARY

The subjects Pharmacology I and Pharmacology II have 15 credits (6 + 9) in the curriculum and are taught in two consecutive years, the second semester of third year and both semesters of fourth year in the Bachelor's Degree in Pharmacy.

Pharmacology is the science that studies the actions and properties of drugs in organisms, understood as drug any chemical used in the treatment, prevention or diagnosis of a disease, or to avoid the appearance of an unwanted physiological process. Bearing in mind this general definition, in Pharmacology I students will first learn the general principles of drug action (general Pharmacology), and will continue with the detailed study of the pharmacological groups acting at the Central Nervous System and at the inflammatory and immunological process. This study will be completed with the subject

Pharmacology II (4th year of the Degree in Pharmacy) with drugs that act on the rest of the physiological systems (Autonomous Nervous System, cardiovascular, respiratory, digestive...). The basic theoretical knowledge of drugs is complemented with practical lessons of experimental Pharmacology in the laboratory, as well as virtual simulations.

It is noteworthy that the focus of the subject and the competencies to be achieved by the students integrate the Sustainable Development Goals (SDG) promoted by the United Nations (Sustainable Development Goals (SDG) Agenda). Among them, the Rational Use of Medicines and the promotion of Community Health (Objective 3: Health and Well-being) and quality Education (Objective 4) stand out for their direct relationship with our subject. In addition, the first part of Pharmacology I also deals with aspects related to SDG 5 (Gender equality) and 10 (Reduction of inequalities), by addressing the differences in the response to drugs according to gender and access to medicines for the entire population.

PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

There are no specified enrollment restrictions with other subjects of the curriculum.

Other requirements

Students must have acquired knowledge of Pathophysiology, Biochemistry, Physiology and Pharmacokinetics necessary to understand the actions of drugs and their therapeutic effects.

OUTCOMES

1201 - Degree in Pharmacy

- To possess and to understand the knowledge in the different areas of study included in the formation of the pharmacist.
- To know how interpret, value and communicate relevant data in the different aspects of pharmaceutical activity, making use of information and communication technologies.
- Skill to communicate ideas, analyze problems and solve them with a critical mind, achieving team-working abilities and assuming leadership whenever required.
- Development of skills to update their knowledge and undertake further studies, including pharmaceutical specialization, scientific research and technological development, and teaching.
- To promote the rational use of medicines and health products
- To participate in the activities of health promotion, prevention of illness, at individual, family and community levels; with an integral and multi-professional vision of the health-disease process.
- To develop communication and information skills, both oral and written, to deal with patients and other health professionals in the center where they carry out their professional activity. To promote the capacity of work and collaboration in multidisciplinary teams and those related to other health professionals.

- To recognize personal limitations and the need to keep up to date professional competence, paying particular attention to the self-learning of new knowledge based on available scientific evidences.
- To acquire basic concepts in Pharmacology (concept of drug, agonist, antagonist, mechanism of action, pharmacological action and interactions, etc.).
- To know and to understand the different mechanisms by which the drugs exert their actions and pharmacological effects.
- To know the pharmacological actions and to relate them with the therapeutic effects and the adverse reactions.
- To relate the physicochemical characteristics of drugs with their pharmacokinetic and pharmacodynamic properties.
- To know the indications and contraindications of the medicines, as well as, the posology and precautions of use.
- To know the methodology for the evaluation of substances with pharmacological activity at the level of experimental pharmacology (in vitro and in vivo).

LEARNING OUTCOMES

- Recognize how the physicochemical characteristics of the drugs determine the influence of the human body on them.
- Identify the general principles of the mechanism of action of drugs and their involvement in drug interactions and adverse reactions.
- Relate the mechanisms of action and characteristics of the most representative drugs that act on the Central nervous system and that are used in the pharmacotherapy of inflammation and pain to their effects, pharmacokinetics, therapeutic indications and contraindications. Promote the rational and appropriate use of drugs.
- Initiating the student into pharmacological research, introducing him/her to the reality of the laboratory by facing experimental problems that he/she should be able to solve.
- Application of theoretical concepts and general methods in the computer classroom and the laboratory.
- Acquisition of skills in searching information necessary to perform their tasks and the interpretation of results.

DESCRIPTION OF CONTENTS

1. INTRODUCTION TO PHARMACOLOGY

To facilitate a progressive learning process, the programme is structured starting from generic and basic concepts of this discipline to more specific ones. It starts with an introductory chapter on the subject.

Chapter 1-Introduction. Basic concepts. (1 h)

The main aim of this chapter is to familiarise students with scientific terminology of the subject and its importance for their training as pharmacists. We include in this chapter the basic principles of the discipline, the most relevant bibliographic sources and those relevant aspects useful to the student who embraces for the first time the learning of this discipline. This chapter contains a brief historical review of Pharmacological Sciences, explains the fundamental concepts to be handled throughout the semester and justifies the programme structure and the evaluation criteria to be applied.
Contents:

Definition of Pharmacology.

Concept of drug, drug, active ingredient, proprietary medicinal product and drugs in the context of Pharmacology.

Access to medicines; essential medicines.

Brief historical introduction.

Development and current objectives.

Importance within the Pharmacy studies.

Classification of the Pharmacological Sciences.

Teaching plan of Pharmacology I.

General Bibliography: textbooks and consultation, magazines and other sources.

2. GENERAL PHARMACOLOGY

This thematic unit describes first the basic principles of action of drugs in the body, in order to understand their interaction with cellular structures and the quantification of its pharmacological response. Next it addresses the various factors that modulate drug responses, starting with the pharmacokinetic factors that will determine the access of the drugs to their places of action, the onset of action and dosage regimens to get the desirable (therapeutic effects), followed by the other causes of variations to the response, as well as basic principles of drug interactions and undesirable (adverse) effects of drugs. Possible differences in response to drugs between men and women, and their consequences, will also be addressed.
At the end of this training unit, students must understand how the physicochemical characteristics of drugs determine its pharmacokinetic properties and how interactions at the molecular level of drugs with different cellular and extracellular components trigger both desirable and undesirable effects.

Chapter 2.- Mechanisms of action of drugs I. Basic principles of Molecular Pharmacology.

Chapter 3.- Mechanisms of action of drugs II: Main signaling pathways.

Chapter 4.- Evaluation of the pharmacological response. Drug-receptor interaction.

Chapter 5.- Pharmacokinetic aspects that modulate the pharmacological response.

Chapter 6.- Pharmacological interactions.

Chapter 7.- Variations in drug response.

Chapter 8.- Drug security. Adverse reactions. Pharmacovigilance.

3. PHARMACOLOGY OF THE CENTRAL NERVOUS SYSTEM

This thematic unit and the following intend that the student learns the scientific principles of a part of the current pharmacological therapy and its future perspectives. Drugs are explained grouped according to their level of performance, establishing analogies and differences between them, thereby facilitating their learning. The syllabus addresses not only their pharmacological actions, but also their adverse reactions, contraindications and precautions to be taken into account for their proper use.

Chapter 9.- Anxiolytic and hypnotic drugs.

Chapter 10.- Antidepressants and drugs to treat mania.

Chapter 11.- Antiepileptic drugs. Central skeletal muscle relaxant drugs.

Chapter 12.- Antipsychotic drugs.

Chapter 13.- Antiparkinsonian drugs. Treatment of Alzheimer's disease.

Chapter 14.- Opioid analgesics.

Chapter 15.- Local anaesthetics.

Chapter16.- General anaesthetics.

Chapter 17.- Psychostimulants.

Chapter 18.- Treatment of drug dependences.

4. PHARMACOLOGY OF INFLAMMATION AND IMMUNITY

Chapter 19.- Antihistaminic drugs.

Chapter 20.- Eicosanoids and non-steroidal anti-inflammatory drugs (NSAIDs).

Chapter 21.- Glucocorticoids.

Chapter 22.- Pharmacotherapy of pain.

Chapter 23.- Immunomodulators.

Chapter 24.- Pharmacotherapy of multiple sclerosis.

Chapter 25.- Pharmacology of rheumatoid arthritis and osteoarthritis.

Chapter 26.- Drugs used in hyperuricemia and gout.

Chapter 27.- Pharmacotherapy of inflammatory bowel disease.

5. PRACTICAL LESSONS

The practical program is closely related to the content of the four thematic units taught in lectures. Therefore, it starts with an Introduction to Experimental Pharmacology and its significance in the development of new drugs. Thereafter the contents of the practical lessons carried out in laboratory are structured into three modules:
Module 1: Analysis of the functional drug-receptor interaction: agonism & competitive antagonism.
Module 2: Pharmacology of the central nervous system: Neuropharmacological screening tests
Module 3: Study of analgesic and anti-inflammatory drugs.

WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	40,00	100
Laboratory practices	15,00	100
Seminars	4,00	100
Tutorials	2,00	100
Attendance at events and external activities	2,00	0
Development of group work	10,00	0
Study and independent work	35,00	0
Readings supplementary material	2,00	0
Preparation of evaluation activities	15,00	0
Preparing lectures	10,00	0
Preparation of practical classes and problem	4,00	0
Resolution of case studies	5,00	0
Resolution of online questionnaires	3,00	0
TOTAL	**147,00**	

TEACHING METHODOLOGY

The subject is designed to facilitate the teaching-learning process and is structured in different classroom activities, coordinated throughout the semester to provide an overview as complete as possible of the developed topic:

* **Theoretical Lessons.-** The students should acquire basic knowledge covered by the syllabus through lecture attendance and personal study. In these lessons, the teacher gives an overview of the topic object of study focusing on the most relevant and complex aspects. To facilitate personal study and preparation of the issues in depth, the proper literature and necessary support material will be indicated or provided to students through the Virtual Classroom;self-correcting questionnaires will be made available as well, so they can assess their level of knowledge and understanding of the programme.

* **Seminars**.- Seminars allow a more active involvement of students to be held in groups of 40 students maximum. It is one of the methodologies that will allow us to work cross-cutting skills. In the seminars students will carry out different types of activities: movie- forum, debates, crossword pharmacological analysis of readings, press reports... Students, gathered in groups of 4-5 students, will prepare the necessary material for the activity to be carried out which will be always related to the contents of Pharmacology I. In coordination with other subjects in the 3rd year of the degree, multidisciplinary seminars, which may cover also topics related to other areas, could be proposed in order to enable the student to relate and integrate concepts learned in the various subjects. In these seminars students will exercise or acquire the capability to search, outline and summarize information and the ability to respond to questions raised in public and defend judgments about scientific matters, in addition to encourage teamwork.

* **Laboratory Practical Lessons.-** Laboratory lessons are carried out in 4 sessions and are related to the theoretical aspects of the various pharmacological groups studied in Pharmacology I. At the beginning of each session, the Professor will point the most important aspects of experimental work and will assist the student during the session. Once the experimental part is carried out, the students will analyse the observed facts and will resolve some issues raised by the teacher at the beginning of the session or during the development of the practical lesson. At the last session students will take a practical exam.

* **Tutorials.-** Tutorials are organized in small groups of students, according to the established timetable. In these sessions, the tutor will evaluate the learning process of the students in a global way. The tutor may raise specific issues of greater complexity to the ones undertaken in regular seminars according to the needs of the students either individually or collectively. Besides, the tutorials will serve to solve doubts that might arise during the lectures and to advise students on strategies to circumvent difficulties that might encounter.

EVALUATION

All aspects set out in the section on methodology of this guide will be considered in the assessment of student learning and you will take place in a continuous manner by the professor.

- **70% of the grade**: will come from the score of the theoretical exam
- **15% of the grade:** will come from the score obtained in practical lessons, which will be compulsory. The score will take into account both the participation and performance in the laboratory (40%) and the marks of the practical exam (60%).Practical lessons are mandatory and in case that a student fails the subject the year in which they were taken, the score will be maintained only for the following year.
- **15% of the grade**: will come from the evaluation of the work done and presented in seminars, tutorials, lectures and other programmed activities in the virtual classroom.

It is an essential requirement to pass the subject to have taken and passed the practical lessons and the theoretical exam.

A student that has participated in various educational activities, but has not taken the theoretical exam, will obtain the rating of "not presented" in the first call of the course. Thereafter, and under similar circumstances, the score may be "Failed". The assessment of seminars, tutorials, assistance and other activities will not be retained for the following academic year.

REFERENCES

Basic

- Flórez J. (editor). Farmacología humana 6ª ed. Elsevier Masson, 2013
- Lorenzo y cols. Velázquez. Farmacología Básica y Clínica. 19ª ed. Med. Panamericana, 2017.
- Rang y Dale. Farmacología. 9ª ed. Elsevier, 2019.
- Katzung B. G. 14ª ed. Farmacología básica y clínica. McGraw-Hill, 2019
- Brunton L. Goodman and Gilman's The Pharmacological Basis of Therapeutics. 13th ed. McGraw-Hill, 2018
- Whalen K. y cols.. Lippincotts illustrated reviews: Farmacología. 7ª ed. Lippincott Williams &Wilkins, 2019
- Brenner and Stevens, Farmacología Básica. 5ª ed. Elsevier 2019
- Golan DE y cols. Principios de Farmacología: Basesfisiopatológicas del tratamiento farmacológico. 4ª ed. Wolters Kluver 2017

Additional

- Agencia Española de Medicamentos y Productos Sanitarios: http://aemps.gob.es/
- European Medicines Agency: www.ema.europa.eu/
- International Vademecum: www.vademecum.es/(en línea a través del aula virtual)
- e-libros disponibles a través del Servicio de Biblioteca y Documentación de la Universidad deValencia: http://trobes.uv.es/