

**Pharmacology**

Code: 102665  
ECTS Credits: 9

Degree	Type	Year	Semester
2502445 Veterinary Medicine	OB	3	A

The proposed teaching and assessment methodology that appear in the guide may be subject to changes as a result of the restrictions to face-to-face class attendance imposed by the health authorities.

**Contact**

Name: Ana Puigdemont Rodríguez  
Email: Anna.Puigdemont@uab.cat

**Use of Languages**

Principal working language: catalan (cat)  
Some groups entirely in English: No  
Some groups entirely in Catalan: No  
Some groups entirely in Spanish: No

**Teachers**

Victoria Clos Guillén  
Fernando de Mora Pérez  
Carles Cristòfol Adell

**Prerequisites**

PHYSIOLOGY (general concepts on organs and systems functioning)

BIOCHEMISTRY (molecular mechanisms of the basic functions of the organism)

**Objectives and Contextualisation**

Contextualisation. Third year studies degree (first semester and first half of second semester).

General objectives: Provide the student with the fundamental concepts in the field of pharmacology. Studying drugs, their mechanism of action and their effects, as the basics of therapeutic pharmacology

Educational Objectives: Acquisition of the basic principles of pharmacokinetics (drug delivery, absorption, distribution, metabolism and excretion), and pharmacodynamics (mechanism of action), interactions and adverse drug reactions, underlying the rational and appropriate use of drugs in the different fields of applied pharmacology.

**Competences**

- Apply scientific method to professional practice, including medicine
- Comunicar la informació obtinguda durant l'exercici professional de manera fluïda, oralment i per escrit, amb altres col·legues, autoritats i la societat en general.

- Demonstrate knowledge and understanding of the general bases of medical and surgical treatments.
- Demonstrate knowledge of English to communicate both orally and in writing in academic and professional contexts.
- Perform basic analytical techniques and interpret the clinical, biological and chemical results, and interpret the results of tests generated by other laboratories.
- Perform the most common medical and surgical treatments of animals.
- Prescribe and dispense medicines correctly and responsibly in accordance with legislation, and ensure that the medicines and waste are stored and eliminated properly.
- Safely perform sedations and regional and general anaesthesia, and evaluate and control the pain.

## Learning Outcomes

1. Apply scientific method to professional practice, including medicine
2. Apply the methodology for pharmacokinetic and pharmacodynamic analysis of molecules and defend the results.
3. Communicate information obtained during professional exercise in a fluid manner, orally and in writing, with other colleagues, authorities and society in general.
4. Demonstrate knowledge of English to communicate both orally and in writing in academic and professional contexts.
5. Explain and analyse the molecular and cellular action mechanism of drugs and its effect.
6. Explain and analyse the phases of the transport of drugs through the organism, i.e. drug kinetics.
7. Explain and defend the pharmacology of the agents that act in different systems, organs and apparatus.
8. Explain the drugs that act in the central and peripheral nervous system.
9. Identify adverse effects and interactions of drugs and analyse the benefit-risk quotient in the administration of drugs.
10. Identify and interpret the phases of drug development and know the bodies involved in their development and authorisation.
11. Identify aspects of pharmaceutical technology that are relevant to the stability of medicines.

## Content

### THEORETICAL / PRACTICAL PROGRAM / EXAMS \*

#### THEORY

#### Introduction to Pharmacology

##### I. Pharmacokinetics

ADME processes. Drug administration and absorption. Distribution of drugs in the body. Biotransformation of drugs. Drug excretion. Pharmacokinetics.

##### II. Pharmacodynamics

General principles of drug action. Pharmacological targets: receptors. Type of receptors. Channel-coupled receptors, G protein-coupled receptors, which control gene transcription. Regulation of the receptors: up- and down-regulation. Other pharmacological targets. Antibodies as selective drugs.

##### III. Factors that limit drug efficacy

Drug interactions. Adverse drug reactions.

##### IV. Drugs acting on the Autonomous/peripheral Nervous System

General aspects of the pharmacology of the peripheral nervous system. Pharmacology of the cholinergic transmission. Pharmacology of noradrenergic transmission. Pharmacology of the motor plaque.

##### V. Pharmacology of the Central Nervous System

Central nervous system: general considerations. Analgesics. Sedative and tranquilizer agents. Antidepressants, Antiepileptic and anticonvulsant drugs. Anesthetic drugs.

## VI. Anti-inflammatory, anti-allergic and immunomodulatory drugs

Steroids. Non-steroidal anti-inflammatory drugs (NSAIDs). Antihistamine drugs Immunomodulatory drugs. Others agents acting on the immune system.

## VII. Anti-infective drugs

General principles of the pharmacology of antimicrobials. Betalactamics: Penicillins and Cephalosporins. . Aminoglycosides and Polypeptides. Quinolones Sulfamides. Tetracyclines and Phenolic. Macrolides and Lincosamines. Antimicotic and antivirals. Antiparasitic agents: Anthelmintics, Ectoparasitic and Antiprotozoa.

## VIII. Systemic pharmacology

Drugs that act on the cardiovascular system. Drugs that act on the respiratory system. Drugs that act on hemostasis. Pharmacology of the digestive system. Drugs with diuretic action. Pharmacological regulation of the endocrine system.

## IX. Anticancer drugs

Cytotoxic agents and other anticancer.

## X. Others

Sources for obtaining new drugs

### - PRACTICAL SESSIONS

Routes of Administration (experimental lab). Absorption of drugs (experimental lab). Drug metabolism (experimental lab). Drug excretion (experimental lab). Pharmaceutical Forms and Formulation (on line). Pharmacokinetic cases (classroom). Journal club (classroom). Drug Discovery (computer simulator). Case study 1 (classroom). Neuromuscular Junction (computer science). Case 2 (classroom). Organ bath: cholinergic drugs (experimental lab). Case 3 (classroom). Cardiolab (computer simulator). How to write a scientific article (online).

### - EXAMS

3 mid-term exams and one remedial exam

### -TEAMS

1 Teams (Introduction)

6 Teams to answer students questions

\*Unless the requirements enforced by the health authorities demand a prioritization or reduction of these contents.

## **Methodology**

- Theory classes: online

- Seminars: The objective is to reinforce some of the concepts that have been developed in theory classes, through practical exercises.

- Practical classes: these are carried out in the experimental laboratory. Students organize themselves to develop the practical experiences where the students learn how to manipulate and administrate the animals under the professor supervision.

- Computer simulations: Here students carry out virtual experiments through Pharmacology programs aimed at reinforcing certain concepts explained in the theoretical program.

- Self-learning: discussion of cases and articles. Students will have to solve on their own account certain cases proposed by the teaching staff, and that they will have to develop in group. A discussion will be made in common. The work groups will be of maximum 3 students and a minimum of 2. In the case of the discussion of articles, the students will have to prepare the oral presentation on different articles proposed by teachers (group work). The work groups will be of maximum 3 students and a minimum of 2.

The proposed teaching methodology may experience some modifications depending on the restrictions to face-to-face activities enforced by health authorities.

Annotation: Within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

## Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Computer simulation	6	0.24	2, 4, 5, 7, 10
Discussion of articles	4	0.16	1, 3, 5, 7, 9, 10
Discussion of cases	6	0.24	2, 3, 4, 8, 6, 10
Practical classes	10	0.4	1, 2, 3, 11, 10
Seminars	4	0.16	2, 5, 6, 9, 10
Theoretical Classes (Magistral)	50	2	4, 8, 5, 6, 7, 9, 10
Type: Autonomous			
Preparation work / article / simulations	29	1.16	2, 3, 4, 8, 5, 9, 10
Study	111	4.44	8, 5, 6, 7, 9, 10

## Assessment

The assessment system consists of tests related to the theoretical / practical part of the program (lectures, seminars and practices) and self-study (cases, works and discussion of articles). It is mandatory to be able to evaluate having completed at least 90% of the practical program.

Theoretical-practical evaluation:

1. 3 exams with different evaluable activities
2. 6 Team / individual projects.

\* Final note:

1. 80% of the tree exams + 20% to the average note of the works
2. Half-notes work: it is necessary that the mark of each part is 4 or higher in order to be able to make the average and obtain the final mark.

To pass the subject, the mean notes obtained in all evaluable activities must be equal to or greater than 5.

Final examination of recovery. This exam must be carried out by students who have not obtained a grade equal to or greater than 4 in all the partial exams or have obtained a final grade (exam + team work) of less than 5, or who wish to improve the grade of a partial one.

Characteristics:

If the mark obtained in the examination of recovery is inferior to the note of the partial one that was tried to surpass, will take into account the highest note.

## REPEATERS

The notes of teamwork are not kept from one course to the next to pass the subject.

Student's assessment may experience some modifications depending on the restrictions to face-to-face activities enforced by health authorities

## Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
3 Exams	80%	3	0.12	1, 2, 3, 4, 8, 5, 6, 7, 11, 9, 10
Cases (3) (evaluated during session)	3.3 %	0	0	1, 2, 3, 4, 8, 5, 6, 7, 11, 9, 10
Exam recovery	80%	2	0.08	1, 2, 3, 4, 8, 5, 6, 7, 11, 9, 10
Presentation and discussion article (2) (evaluated during the session)	3.3 %	0	0	1, 2, 3, 4, 8, 5, 6, 7, 11, 9, 10
Writing (scientific paper)	3.3 %	0	0	1, 3, 4, 7

## Bibliography

- ADAMS, H.R. Veterinary Pharmacology and Therapeutics. Iowa State University Press/Ames, 8ª Ed (2001)

- BOOTHE, D.M.. Small Animal Clinical Pharmacology and Therapeutics. 1a edició. W.B. Saunders, 2001

- BAÑOS, JE, FARRE, M. *Principios de Farmacología clínica: bases científicas de la utilización de medicamentos*. Ediciones Masson, (2002).

- BRUNTON LL et al. Goodman and Gilman: Las Bases Farmacológicas de la Terapéutica. Editorial McGraw-Hill Interamericana, 11ª ed., (2006)

- BOTANA, LM. *Farmacología Veterinaria*, (2016) on line:

[http://www.medicapanamericana.com/visorebookv2/ebook/9788498359503#{"Pagina":"Cover","Vista":"Indice","B](http://www.medicapanamericana.com/visorebookv2/ebook/9788498359503#{)

- BRUNTON LL et al. Goodman and Gilman: Las Bases Farmacológicas de la Terapéutica. Editorial McGraw-Hill Interamericana, 11ª ed., 2006

- FLOREZ, J, ARMIJO, JA, MEDIAVILLA, A. *Farmacología Humana*. Barcelona: Elsevier España, 6a Ed (2014).

- GIGUÈRE S, PRESCOTT SF, BAGGOT JD, WALKER RD & DOWLING PM. Antimicrobial Therapy in Veterinary Medicina. 5<sup>th</sup> Edition (2013)
- HILAL-DANDAN, R, BRUNTON, LL. *Goodman & Gilman's: Manual of Pharmacology and Therapeutics*. New York: Mc-Graw-Hill Interamericana, 2nd Ed (2014).
- HITNER H, NAGLE B. Introducción a la Farmacología. Editorial Mc-Graw-Hill Interamericana, 5ª ed, (2007)
- KATZUNG B G, MASTERS SB, TREVOR AJ. Farmacología básica y clínica. Editorial McGraw-Hill Interamericana, 11a ed, 2010
- PLUMB, DC. *Plumb's Veterinary Drug Handbook*, 9 Ed (2018)
- RANG ANDDALE. Pharmacology, 9 Ed (2019)
- RIVIERE, JE, PAPICH, MG. *Veterinary Pharmacology and Therapeutics* 9 Ed (2009)
- Flashcards de Farmacologia bàsica. Com accedir-hi: entrar a la web de la biblioteca: <https://www.uab.cat/biblioteques/> Després a revistes digitals i finalment posar: Flashcards de Farmacologia bàsica (hi ha tb una entrada de Flashcards de Rang&Dales)

#### ALTRES FONTS ONLINE

<https://pubmed.ncbi.nlm.nih.gov/>

[World Wide Science.org](http://WorldWideScience.org)

[Springer Link](#)

Ref seek

BASE (Bielefeld Academia Search Engine)

[ScienceResearch.com](http://ScienceResearch.com)

#### **Software**

Medicines. The Discovery Process. Sheffield BioScience (Zeneca Pharmaceuticals). Sheffield, UK (1999).

Neuromuscular Pharmacology. Sheffield BioScience programs. 2 Woodgates Mount, North Ferriby, UK (2020).

Cardilab. Biosoft (UK and USA) [info@biosoft.com](mailto:info@biosoft.com) [www.biosoft.com](http://www.biosoft.com) (2000)