

**Pharmacology**

Code: 102665  
ECTS Credits: 9

Degree	Type	Year	Semester
2502445 Veterinary Medicine	OB	3	A

**Contact**

Name: Victoria Clos Guillén  
Email: Victoria.Clos@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**

Fernando de Mora Pérez  
Ana Puigdemont Rodríguez  
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.

This subject includes teaching activities in English, identified in this guide as DA.

**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 (86 classroom hours)

#### -THEORY (50 h)

Introduction to Pharmacology (1 h).

#### I. Pharmacokinetics (8 h)

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

#### II. Pharmacodynamics (4 h)

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. Gene therapy.

#### III. Factors that limit drug efficacy (3 h)

Drug interactions. Adverse drug reactions.

#### IV. Drugs acting on the Autonomous/peripheral Nervous System (5 h).

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 (7 h)

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 (4 h).

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

VII. Anti-infective drugs (10 h)

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 (6 h)

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 (1 h)

Cytotoxic agents and other anticancer.

X. Others (1 h)

Sources for obtaining new drugs

- PRACTICAL SESSIONS (30 h)

Routes of Administration (experimental lab). Absorption of drugs (experimental lab). Drug metabolism (experimental lab). Drug excretion (experimental lab). Pharmaceutical Forms and Formulation (experimental lab). 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 (classroom).

- EXAMS (8 h)

3 mid-term exams and one remedial exam

## Methodology

- Theory classes: master and interactive classes. Some will have reverse class format (flipped classroom).

- Classroom Seminars: in smaller groups approximately 50 students. The objective is to reinforce some of the concepts that have been developed in theory classes, through practical exercises.

- Practical classes: carried out in the experimental laboratory. Small student groups to develop the practical experience where the students directly manipulate the animals under the supervision of the professor.

- Computer simulation: Virtual experiments aimed at reinforcing concepts explained in the theoretical program (One of the simulations is delivered in English, DA)

- Self-learning: discussion of cases and articles. Students team-work. Students will have to discuss/solve cases proposed by the teaching staff. Brainstorming: on-site discussion. The working teams will be of maximum 3 students and a minimum of 2. (One of the case discussions is included in DA). In the article discussion session (journal club), the students will have to prepare an oral presentation based on an article proposed by the teaching staff (team work).

## 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	12	0.48	1, 2, 3, 11, 10
Seminars	2	0.08	2, 5, 6, 9, 10
Theoretical Classes (Magistral)	50	2	4, 8, 5, 6, 7, 9, 10
Type: Autonomous			
Preparation work / article / simulations	28.2	1.13	2, 3, 4, 8, 5, 9, 10
Study	111	4.44	8, 5, 6, 7, 9, 10

## Assessment

Students assessment is build on tests over the theoretical / practical lessons (masterclass, classroom seminars, and practical work), and the self-study sessions (cases, and articles). It is mandatory to attend at least 90% of the practical program.

Theoretical-practical evaluation:

1. 3 mid-term exams/test divided in two parts: a) Multiple-choice questions - MCQ (50%) and b) reasoning questions (50%).
2. 6 additional marks (team or individual).

\* Final grade distribution:

1. 80%: average of the three mid-term exams + 20%: average of the 6 works.
2. To get an average of the three mid-term exams it is mandatory to obtained in each mid-term exam at least 4.
3. To get an average of additional marks, grades should be at least 4.

In order to pass, the final grade should be at least 5.

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Final remedial exam: undertaken by students who have obtained a final grade (exam + team work) of less than 5, or who wish to improve a specific mid-term grade.

### Features:

3 MCQ sections and 3 reasoning questions sections corresponding to each mid-term contents.

Students must inform which partials they will make 4 days before the exam date.

The conditions to pass are the same as those described above (\* under final mark).

If the mark obtained in the remedial for a specific mid-term contents is below the one obtained in the mid-term exam, the highest grade will be taken into account.

### Repeat students:

The mid-term exam marks may NOT BE PRESERVED from year to year.

The teamwork or individual additional marks may be preserved from year to year. The repeating student has theright, but not the obligation, to redo the whole practical program. In that case, the professor responsible for the subject needs to be made aware with advanced notice.

### English evaluation:

The English level will be assessed. The English mark obtained will not preclude the student from reaching the maximum grade; it is rather used as a bonus mark .

## Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
2 Presentation and discussion article (evaluated during the session)	10%	0	0	1, 2, 3, 4, 8, 5, 6, 7, 11, 9, 10
3 cases (evaluated during session)	10%	0	0	1, 2, 3, 4, 8, 5, 6, 7, 11, 9, 10
Exam 1	26,6%	1.45	0.06	1, 2, 3, 4, 8, 5, 6, 7, 11, 9, 10
Exam 2	26,6%	1.45	0.06	1, 2, 3, 4, 8, 5, 6, 7, 11, 9, 10
Exam 3	26,6%	1.45	0.06	1, 2, 3, 4, 8, 5, 6, 7, 11, 9, 10
Final Exam	Recovery	1.45	0.06	1, 2, 3, 4, 8, 5, 6, 7, 11, 9, 10

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